FOUNDRY TRADE JOURNAL

EST. 1902

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Offices: John Adam House, John Adam St., London, W.C.2

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THE FOXBORO AIR WEIGHT CONTROL SYSTEM is specially developed to provide the Foundry Industry with Uniform Cupola Control. This completely Automatic System controls the weight of Air delivered to the Cupola, reduces fuel consumption and makes possible :—

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Photo by permission of Messrs. Macmillan Foundries Ltd., Watford.

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MARPLE, STOCKPORT, CHESHIRE. Telephone: MARPLE 1422-3.

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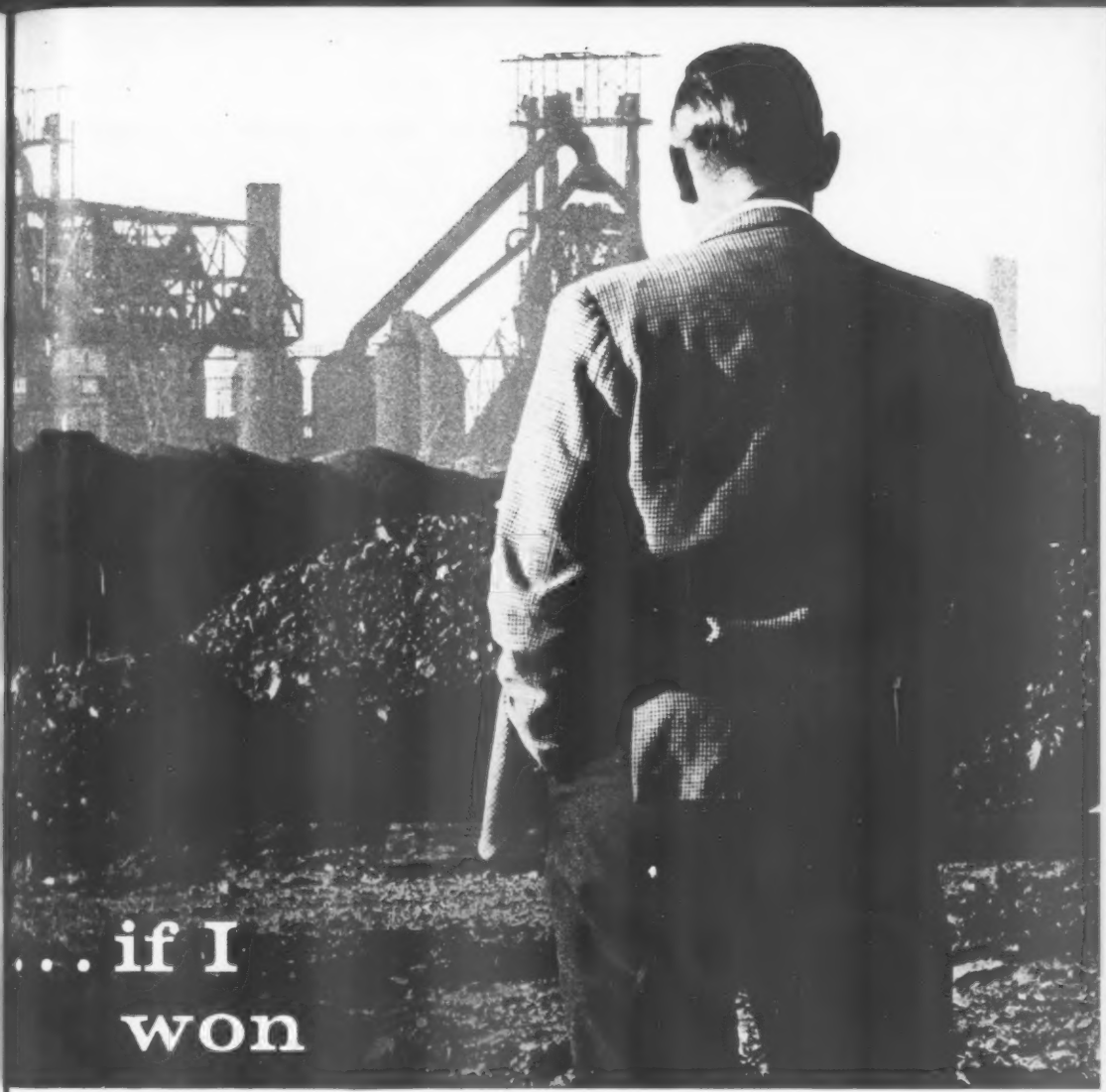

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

"Heaven help us if we carried on that sort of caper at AW. Customers don't want firms that are up one minute and down the next. When buyers come to a company with our reputation they expect—and get—a reliable performance. Fancy telling them that a load of pig wasn't up to specification because one of our furnacemen was off form!

"I reckon I'd get a coupon up every week if footballers were only half as consistent as the AW team."

REFINED PIG IRON

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Subsidiary Company: Jarrow Metal Industries Limited · Western Road · Jarrow · Co. Durham

AUTOMATIC CHARGING CYCLE "One-man" control

CRANE operator controls the making up of Metallics Charge in Weigh Hopper, he also controls the sequence of delivering the complete charge via Drop Bottom Bucket Charger into Cupolas. Each furnace has a 17-ton per hour capacity. The automatic cycle of operations, including Coke and Stone feed to Weigh Hopper with recording of charge weights, are all under one-man push-button control in Crane Cab.

A new concept in MODERN FOUNDRY ECONOMICS

Our installations can also incorporate other modern features such as Slag Granulation, Wet Arresters, Water Cooled Melting Zones, etc., etc.

Illustration (reproduced by courtesy of Messrs. BILSTON FOUNDRIES Ltd.) is similar to the one described above.

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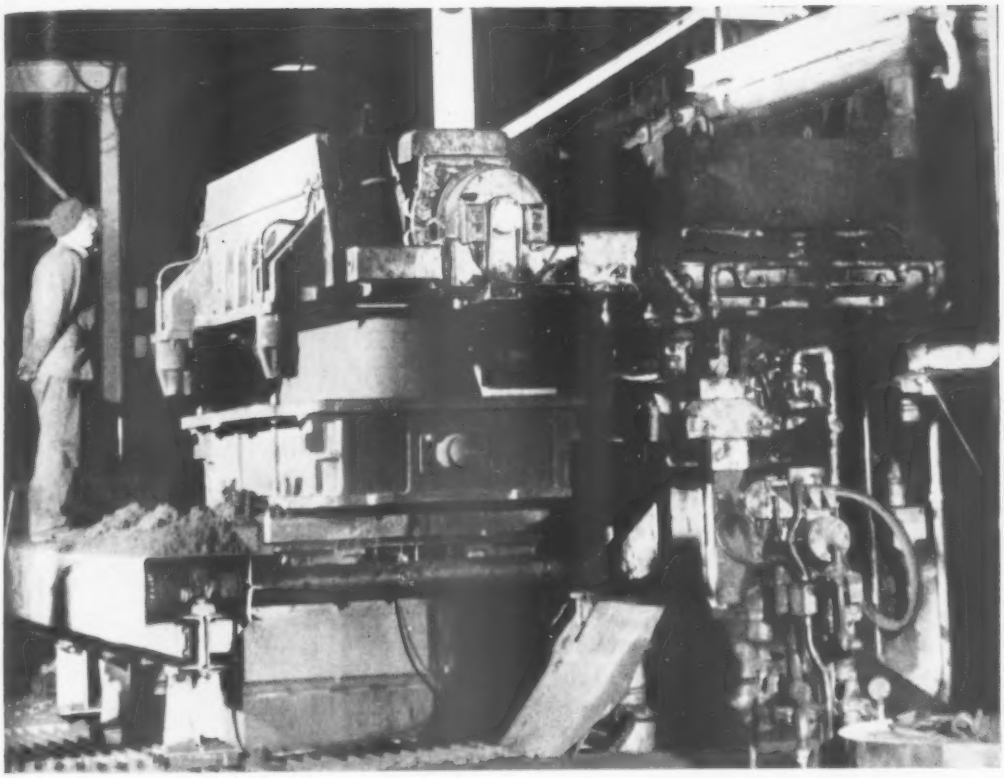
Telephone: Keighley 4215/6 **KEIGHLEY · YORKSHIRE** Telegrams: "Climax" Keighley

J.J.M.



One pair of Herman machines makes 60 baths each hour in the foundry of British Bath Company Limited, Greenford. Picture shows drag machine rolled over.

Photograph by courtesy of British Bath Co. Ltd.

Built in England by

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A LARGE NUMBER OF THESE BOXES WERE MADE WITH ONLY ·003″ PIN CLEARANCE.
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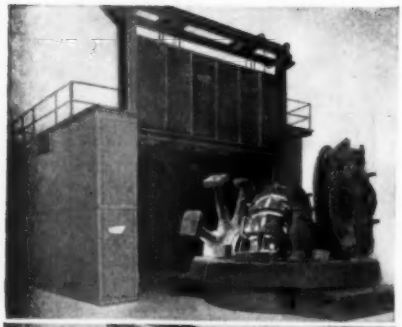
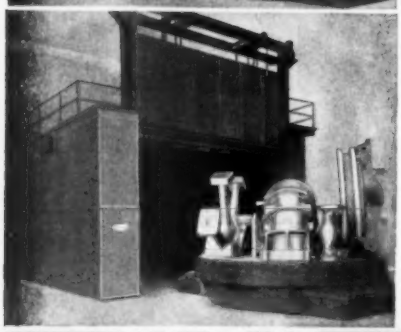
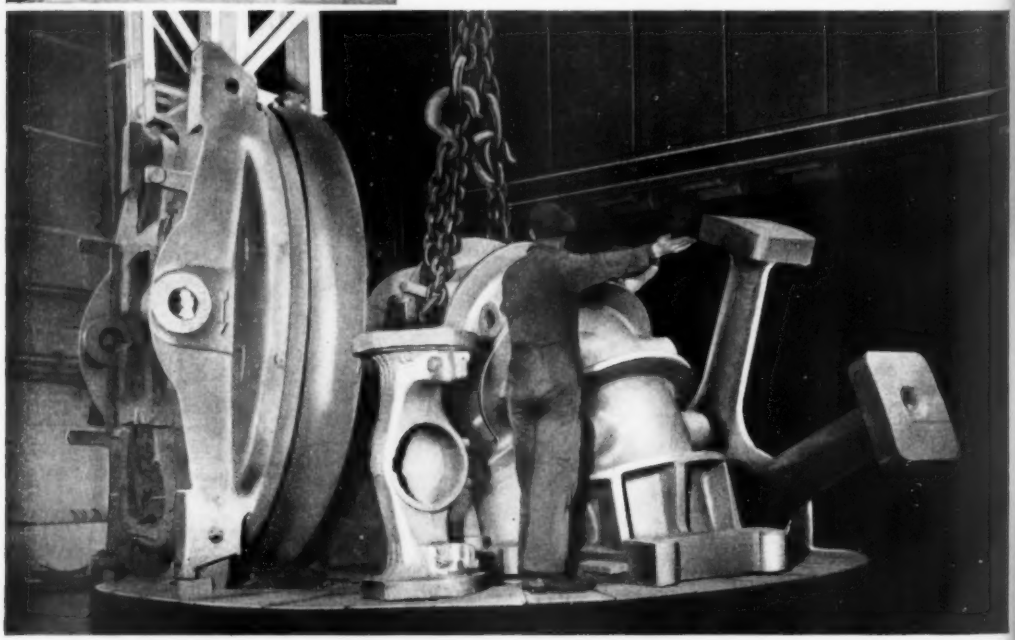




The World's Largest Mechanical

Shot Blast Room Plant

The Tilghman's Wheelabrator Room Plant shown in the accompanying illustrations is 30ft. by 25ft. by 16ft. high, and is installed at Messrs. F. H. Lloyd and Co. Ltd., Wednesbury. This plant, which is fitted with five Wheelabrator units, handles the production from two large bays, the components being loaded on to a bogie equipped with a circular table. Rotating and oscillating motions are provided to the bogie during the cleaning cycle, ensuring maximum blast coverage.



TILGHMAN'S LIMITED BROADHEATH ALTRINCHAM CHESHIRE
LONDON OFFICE: 1 Chester Street, S.W.1. A member of the Staveley Coal and Iron Co. Ltd. Group

AGENTS: MIDLANDS: R. J. Richardson & Sons Ltd., Commercial Street, Birmingham, 1.
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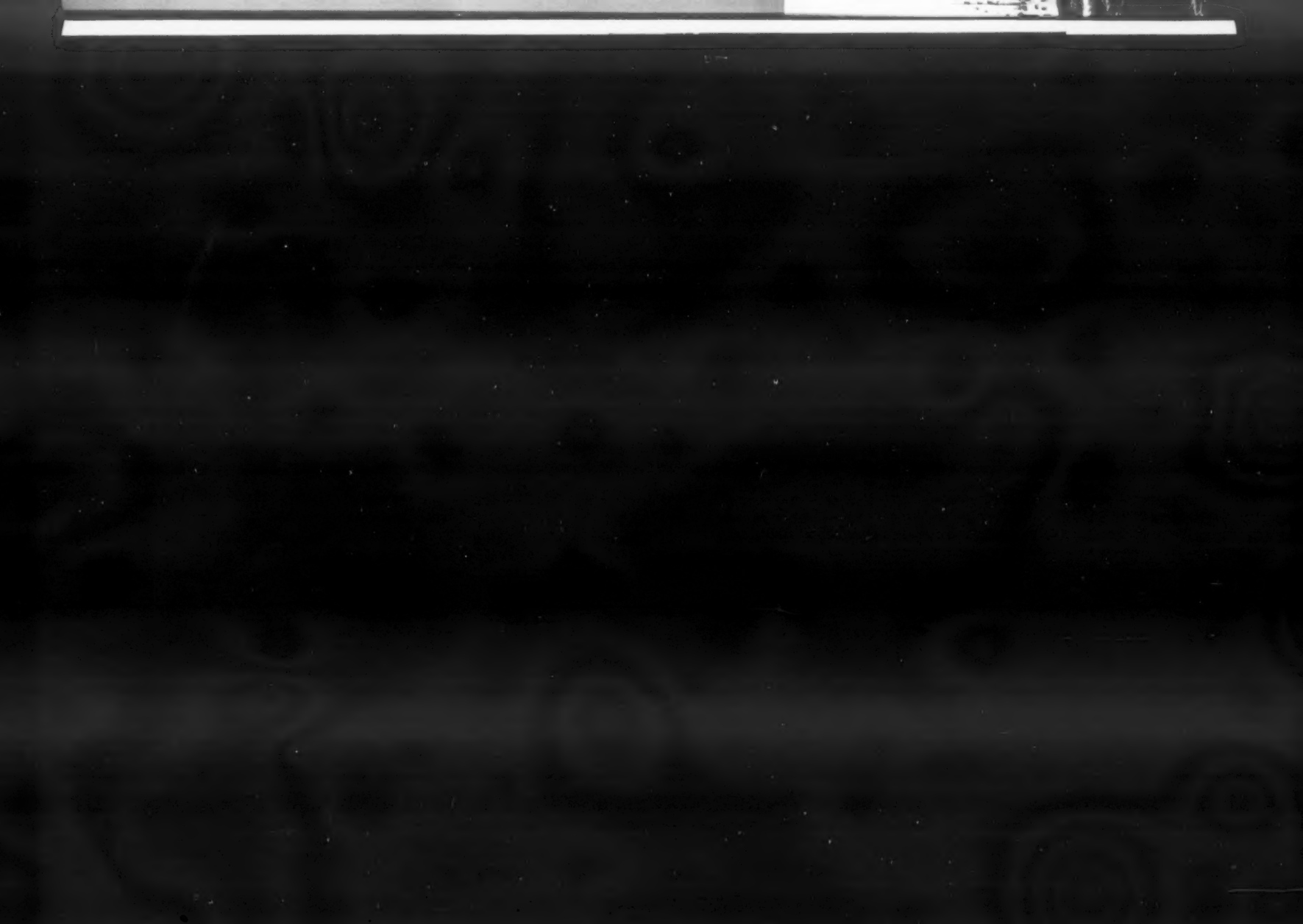

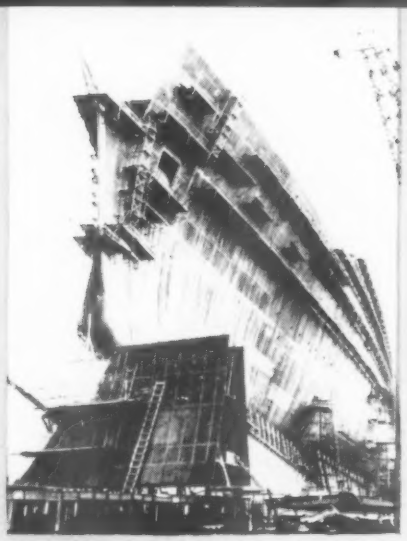

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Castings in the new liner "FRANCE" have been fed with Foseco exothermic products made and supplied by our French Associate Company, Societe Francaise des Catalyseurs.

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With the Centriblast Airless
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ONE OPERATOR CAN

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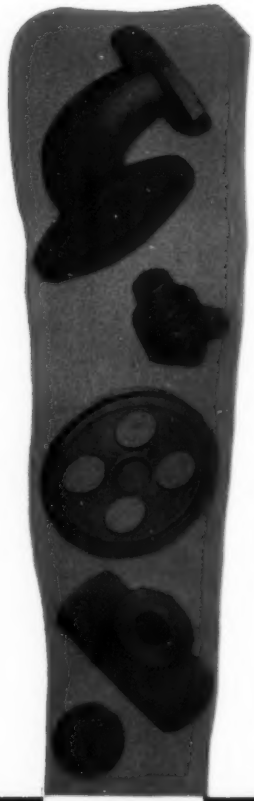
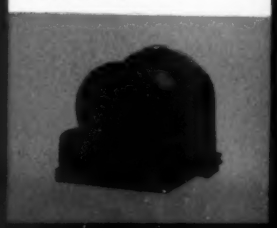


If you require to clean any type of casting we have a machine for you.

Centriblast Airless Rotary Barrel Blast Cleaning Machine



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HARBOND
CEREAL BINDERS

ILLUSTRATION SHOWS A 10 TON LATHE BED CASTING IN GREY IRON PRODUCED BY MESSRS. NOBLE & LUND LTD., GATESHEAD. ALL CORES (APPROX. 6 TONS TOTAL WEIGHT) WERE MADE WITH SEATON CAREW SAND – 2½% HARBOND "OM" CEREAL BINDER – ½% VICTOL CORE OIL.

HARBOND CEREAL BINDERS are produced to a standard of quality and uniformity unequalled in the foundry trade. They have many uses in the foundry and lend themselves readily to a wide range of applications. They can be used equally well in core sand mixes—either oil or resin based—or as moulding sand binders. They have high water absorbing properties and so can be used with either dried or undried sand.

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LEARN MORE ABOUT THESE VERSATILE BINDERS BY ASKING FOR INFORMATION LEAFLET No. 8

MANUFACTURED BY

HARBOROUGH CONSTRUCTION CO·LTD·MARKET HARBOROUGH

FOCUS ON 'FULBOND'

Nº6 'FULBOND' in naturally bonded moulding sands

The advantages of using FULBOND in natural moulding sands are:—

1. Considerable savings can be made by reducing additions of new sand and adding a small quantity of FULBOND to balance the moulding properties. It is a fallacy to assume that because of the initial cheapness of natural sands, large quantities can be discarded on the grounds of cheap practice. A large proportion of the discarded sand contains good bond, coal-dust, pitch or other organic materials, which are relatively expensive.
2. Low clay content sands can be quickly converted into useable moulding sands, simply by adding FULBOND and milling for 3-4 minutes.
3. The high absorption capacity of FULBOND will take care of some of the excess water which occurs in new sands in wet weather.
4. Sand mixes containing FULBOND can be prepared to any pre-determined green strength, irrespective of the combined properties of the new sand and reclaimed sand.
5. Very often, the milling facilities of jobbing foundries are inadequate to process all the sand in circulation. The addition of FULBOND will enable milling time to be reduced, thereby increasing the output of milled sand.
6. In foundries where sufficient milling capacity is available, FULBOND enables a unit sand to function in place of separate facing and backing sands.

For a copy of this Brochure please write to:

THE FULLERS' EARTH UNION LIMITED

Patteson Court, Nutfield Road, Redhill, Surrey

A member of The Laporte Group of Companies

CMF61

The large economy size

Where replicas of large master patterns are required, Araldite casting resins provide exact duplicates in a very short time and at much lower cost for labour. Epoxy resins give extremely accurate reproduction of a mould surface. Setting takes place at room temperature, and there is no shrinkage, so that the operation of making a double-contraction pattern can be saved. For these large patterns, Araldite casting resin is used in conjunction with glass cloth laminates to give stability and flexural strength, and followed by a suitable filler. Patterns cast in Araldite are tough and not easily damaged. They need little care in storage, and are resistant to damp and chemical attack, so that they can be used for work employing the CO_2 process. Alterations are easily carried out when required, by using a paste of Araldite resin and hardener, with filler.

Replica of master pattern, 6 ft long, for a diagonal brace of a Caterpillar D8 Tractor. Cast in Araldite by Wilkinson & Co. Ltd, Bilston, for F. H. Lloyd & Co. Ltd, Wednesbury, suppliers of castings to Caterpillar Tractor Co. Ltd, Glasgow.

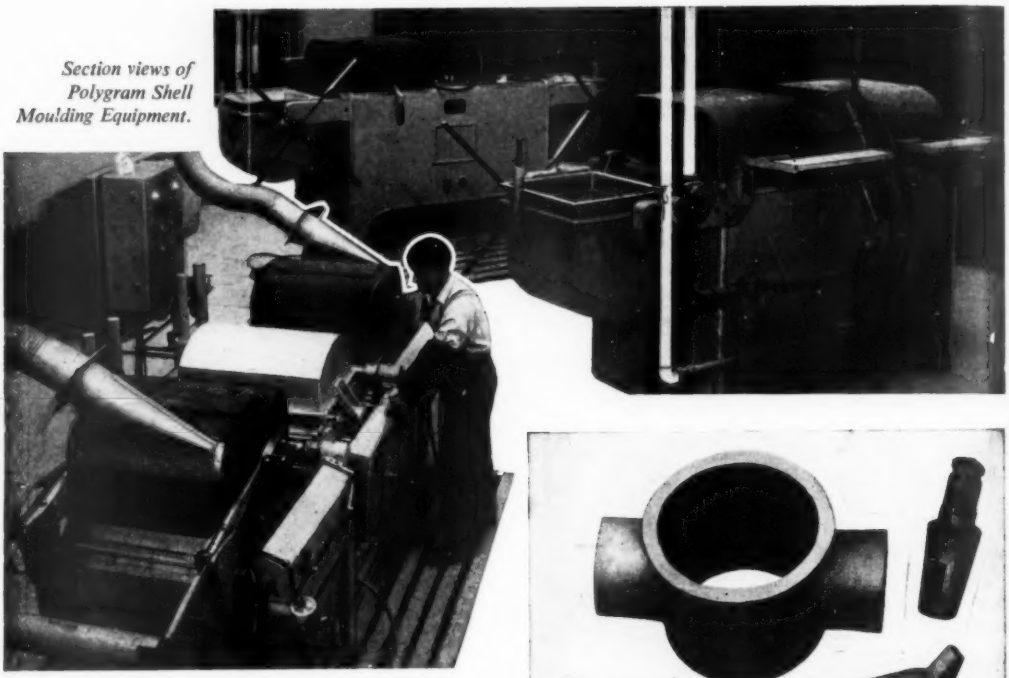
Araldite *epoxy resins*

Araldite is a registered trade name

CIBA (A.R.L.) LIMITED *Duxford, Cambridge. Telephone: Sawston 2121*

Polygram.. in the new Steel foundry of Samuel Osborn & Co., Limited

Section views of Polygram Shell Moulding Equipment.



Samuel Osborn & Co., Limited, achieve greater accuracy, soundness and improved surface finish by Shell Moulding a wide variety of castings in Stainless, Acid and Heat Resisting Steels, as well as other High Alloy, Tool, Die and Low Carbon Steels.

A varied range of Shell Moulded Steel Production castings.
Photograph by courtesy of Samuel Osborn & Co., Limited, Sheffield.

Polygram Casting Company have a competent and complete service to offer, and your enquiries are invited.

Polygram

THE FIRST NAME IN SHELL MOULDING

Polygram Casting Company Limited, Shernfold Park, Frant, Tunbridge Wells, Kent. Telephone Frant 346 (5 lines)

trouble-free bunker discharge

The primitive, inefficient method commonly used for clearing material which sticks in a storage bunker is by applying a sledge hammer to the side of the hopper. This is a form of low frequency, uncontrolled vibration. When vibration is applied at the *correct* frequency, the *correct* amplitude and the *correct* point of application, almost any material can be satisfactorily discharged.

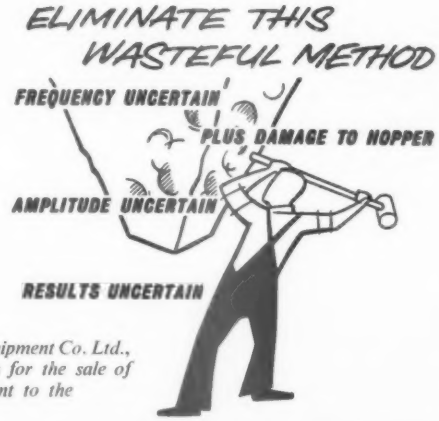
SINEX has the experience with a wide variety of materials and a wide range of hopper designs to recommend how vibration should be applied effectively to solve *your* particular problem.

The three examples illustrated show three different combinations which are typical of many applications, but even these, whilst using the same type of unit, can only be effective if the types of unit themselves are placed in the correct position and have the correct frequencies and amplitudes of vibration, to suit the characteristics of the material to be discharged.

It would pay you, therefore, to make use of our experience and to consult us on your particular problem.

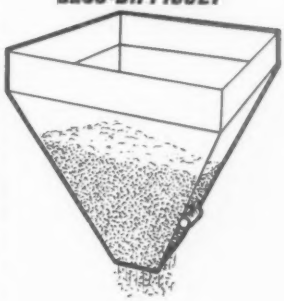
Send for relevant details and information sheet.

These are some of the many materials which we have handled satisfactorily and ensured trouble-free bunker discharge: Pulversized and small coal, iron-ore, coke, lime, flour, grain, grist, foundry sand, soda ash, cullet, sand, gravel, granite chips and all road stone materials.



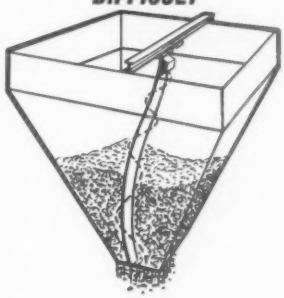
Foundry & Metallurgical Equipment Co. Ltd., have been appointed Agents for the sale of Sinex Engineering Equipment to the Foundry industry.

LESS-DIFFICULT



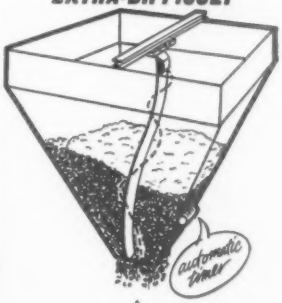
The installation of an external vibrator to a steel hopper.

DIFFICULT



The vibrating reed for application where external vibration is impractical due to structural or other difficulties and if the bunker is made of concrete.

EXTRA-DIFFICULT



A combination of internal and external bunker vibration. Where the external vibrator is timed for 'on and off', the vibration frequency, on slowing down, goes through the natural resonance of the bunker, irrespective of load material contained.

Sinex

Bunker clearance Equipment

SINEX ENGINEERING COMPANY LIMITED, CENTRAL WAY, NORTH FELTHAM TRADING ESTATE, FELTHAM, MIDDLESEX
Tel: Feltham 5081 (5 lines) Telegrams: Sinexvibro Feltham.
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and we are proud of the
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be pleased to discuss
details fully with you.

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30-ton capacity Air Furnace

Installed at the well-known Roll Foundry of Messrs. R. B. Tennert Limited, Whifflet Foundry, Coatbridge

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Flame length up to 40ft.—Full flame intensity within 6ft. of burner nozzle—Charge of 30 tons of semi-steel melted in 8 hours—Raise to 1,450°C. in 2–3 hours—Top charging.
Fuel consumption on 30 tons charge when melting daily: 8 cwts. of pulverite per ton of metal melted.

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Air Flow Indicators—Primary and Secondary Air.
Pulverised Fuel Control Equipment, including Fuel Flow Dial Indicator.

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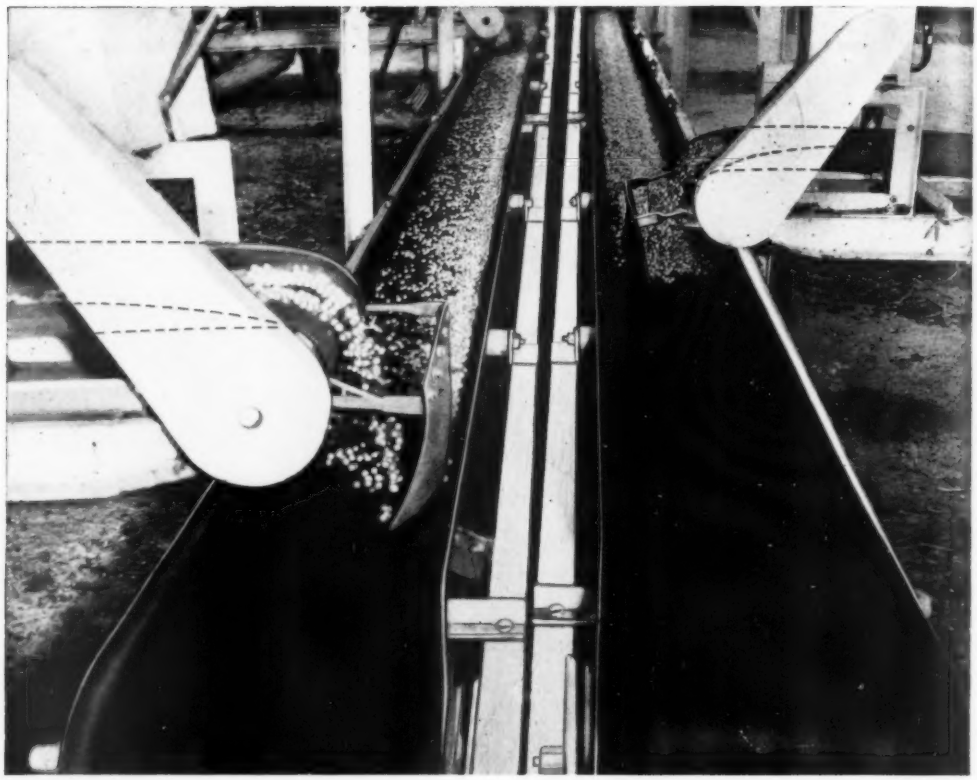
PHONE: GUISBOROUGH 59 GRAMS: MATHISON, GUISBOROUGH



ROWNSONS **12″** wide Capacity U Belt running at 220 feet per minute will carry 2,580 cubic feet of material per hour; equivalent to **110 tons** of Sand without spillage, the material being safely contained between the vertical sides. Harmful static rubber side skirting is eliminated by using the U Belt—the belt with the Built-in sides.

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ROWNSONS

Capacity U Belt

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TRIPLE GEAR CHAIN BLOCKS

SHORT HEAD-ROOM. Light weight. Compact and highly efficient. Capacities from 1 ton to 20 tons.

Sole Distributors For

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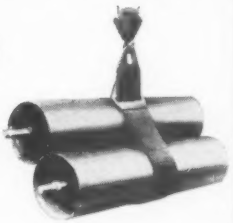
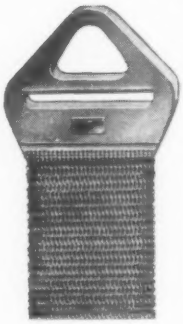
WIRE BELT SLINGS



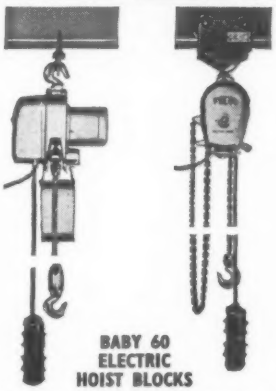


THE SLING WITH 1,000 USES

The "Wedco" wire Belt Sling has the strength of steel combined with maximum flexibility and a wide bearing surface giving exceptional load stability.
Made from thousands of strands of sturdy woven wire in a smooth transverse loop construction "Wedco" Wire Belt Slings cannot snap or tear. They are safer, easier to handle, faster to rig and will not whip, kink or tangle.
In the field of mechanical handling this is something you should know more about, write us for the fullest details.

RATCHET HOISTS

Incorporating a patented Overload Preventer giving greater security and safety to the operator, also reducing wear and saving cost of maintenance. A free - wheeling feature enables quick adjustment of unloaded chains.



BABY 60 ELECTRIC HOIST BLOCKS

BRITISH MADE. Patents Pending. 5 and 10 cwt. capacity. Light weight, compact and portable. Pushbutton control. Upper and lower overtravel limit switches. Supplied for any height of lift to suit requirements. Top hook suspension facilitates attachment to travelling trolleys or girder clamps, etc.

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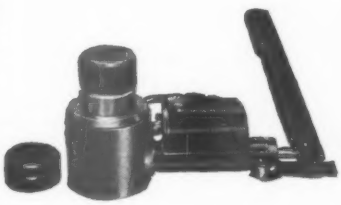
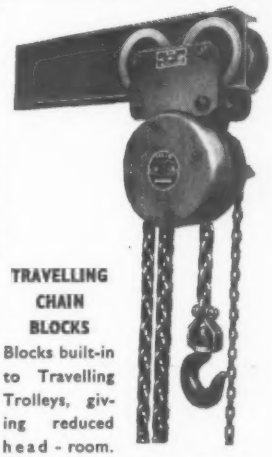
Large capacity for use in confined spaces. Swaying under load eliminated by large diameter providing easy adjustment of height. Capacities from 10 to 30 tons.





TRAVELLING CHAIN BLOCKS

Blocks built-in to Travelling Trolleys, giving reduced head - room. Capacities from 1 ton to 20 tons.

FELCO HOISTS LTD., 29 CROMWELL ROAD, SOUTH KENSINGTON, LONDON, S.W.7

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PERFECT PATTERN DRAW (AIR-ON-OIL)

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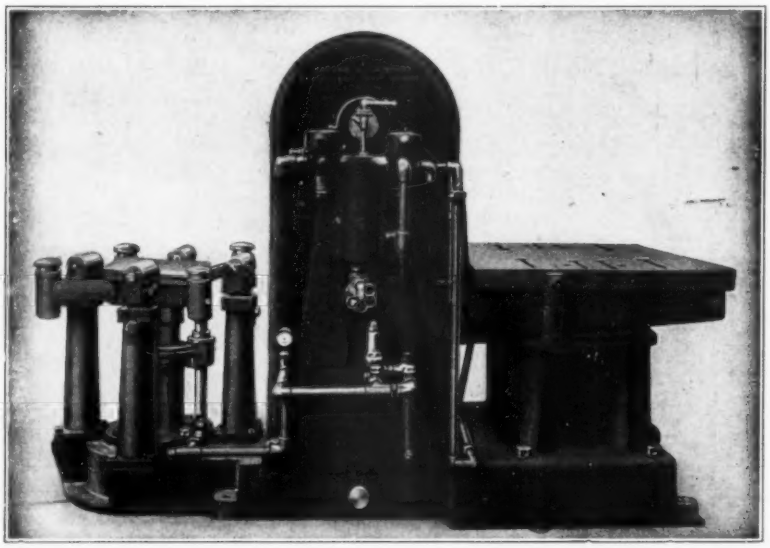
INSTANTANEOUS POWER OPERATED CLAMPS



SMOOTH ROLLOVER (AIR-ON-OIL)

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SPEEDY ROLLER DISCHARGE

SAND PROTECTED "SHOCKLESS" JOLT RAM ROLL-OVER MOULDING MACHINE

Sizes "C", "D" and "E"

Roll over Plate & Jarring Head automatically locked into
ONE RIGID UNIT
when jolting, ensuring
NO PLATE WOBBLE or SECONDARY JOLT

We manufacture many other types and sizes of Moulding Machines suitable for economical production of varying classes of work. Catalogues giving full details will be sent on request.

MACNAB & Co. Ltd.

PRESTIGE HOUSE · 235 IMPERIAL DRIVE
HARROW, MIDDLESEX Phone: PINNER 0600

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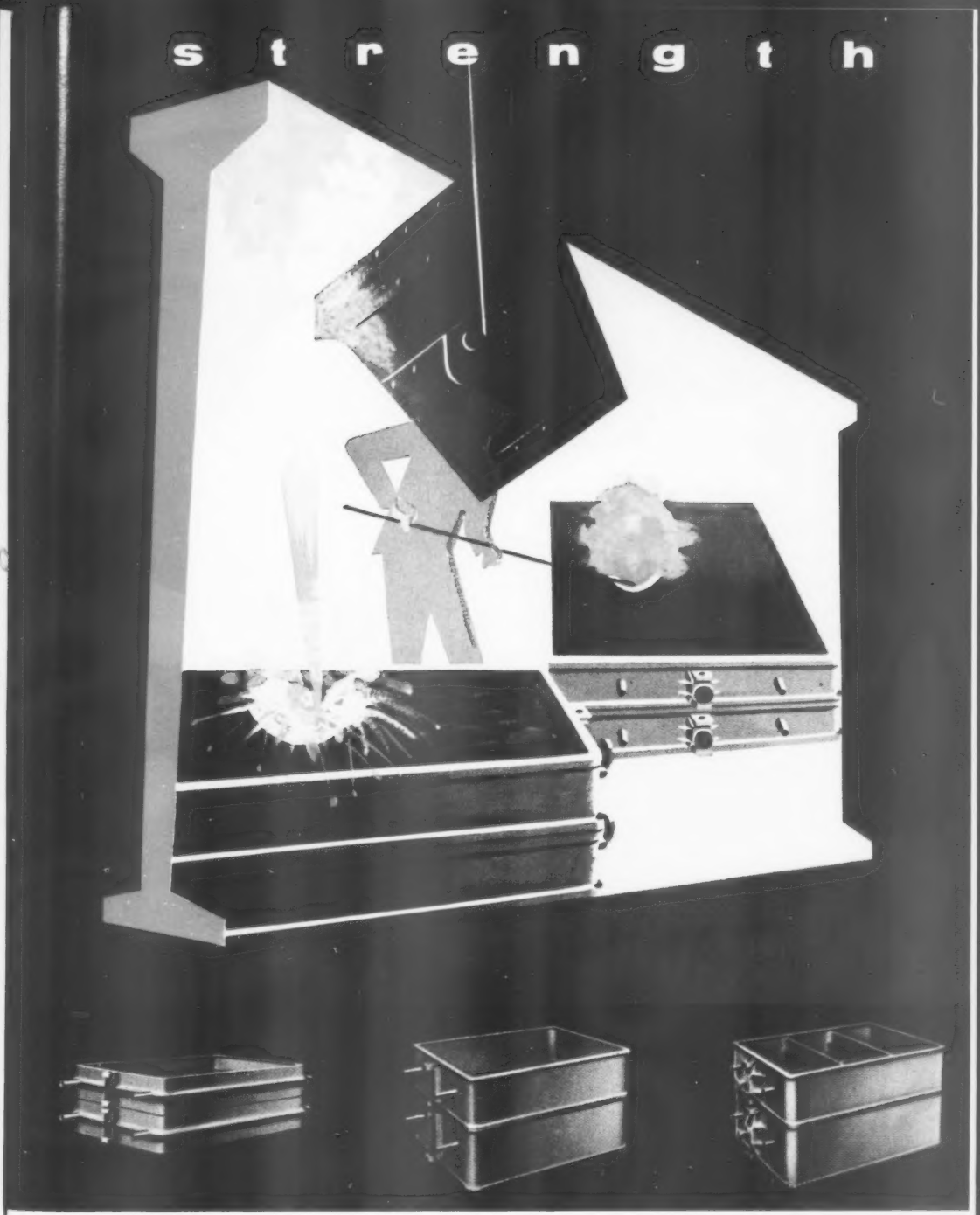

Solid flange which will not curl or crack . . .
solid rolled sections designed to resist all strains . . .
steel of special analysis . . . ensure long life in service

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STERLING FOUNDRY SPECIALTIES LTD., BEDFORD, ENGLAND

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STANDARD
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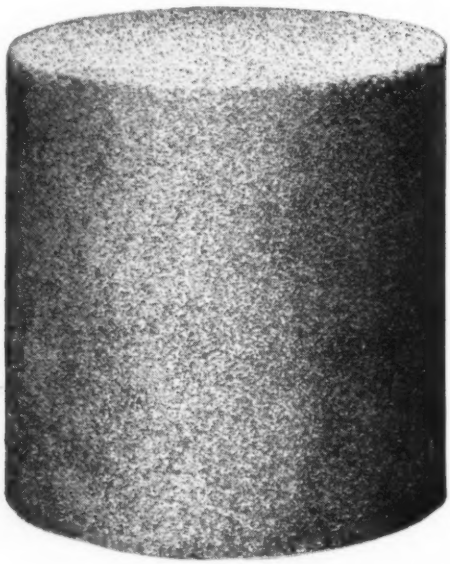

LEADERS
IN THE
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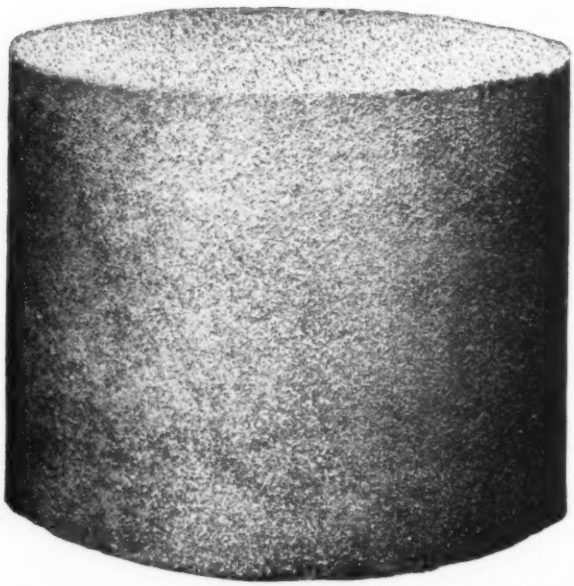
FERRO SILICON



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Fourteenth century carving in Winchester Cathedral of sow playing the double pipe while suckling her litter
Photograph by Ruth Meyler & F. C. Sillar

50 MILLION PIGS GO TO MARKET!

In the early days of the industrial revolution manufacturers frequently looked for familiar and easily recognisable descriptions of their products. To the countryman transplanted into industrial surroundings nothing was more familiar than a pig; a fact which is emphasised by carvings in scores of old churches depicting pigs suckling their litter, rooting for acorns and playing the bagpipes. (Apparently this last pastime was forsworn by pigs many years ago because of unpleasant associations between bagpipes and pigs bladders.) Consequently, when from Blast Furnaces was directed into long troughs from there into short and narrow troughs placed at angles, a resemblance to sows suckling their appen litter led to the description of 'pig iron'.

This series of advertisements illustrates some o 'ecclesiastical' pigs and emphasises the 50,000,000 'p pigs which Warner and Company have supplied to Foundries producing High Duty Castings.

WARNER WARNER WARNER

"Pioneers of *Refined Pig Iron"*

KA

WARNER & CO. LTD., MIDDLESBROUGH

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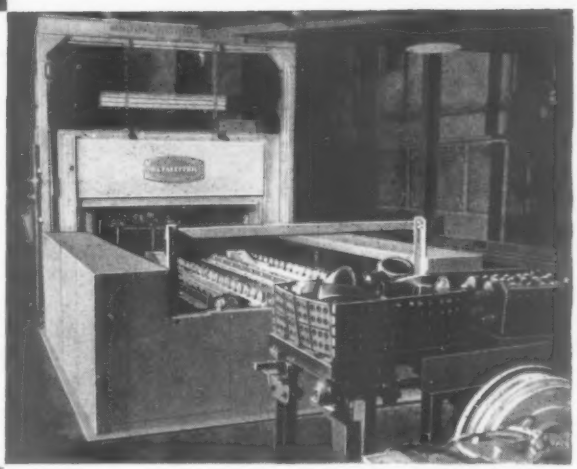
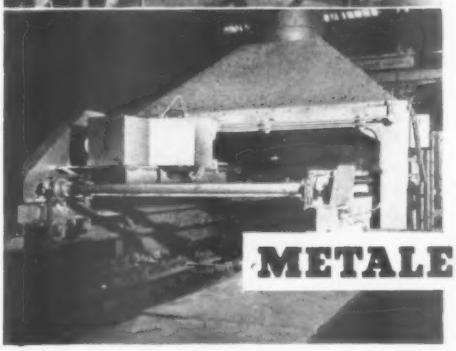
MALLEABLIZING CONTINUOUSLY

PEARLITIC AND FERRITIC MALLEABLE FROM THE SAME PLANT





Equipment for continuously producing ferritic and pearlitic malleable has been in operation for over four years, and the Metalectric plant installed at the Dagenham Works of The Ford Motor Co. Ltd., provides ample proof of the reliability of this form of annealing. The high degree of anneal coupled with ease in handling and the provision of a completely automatic plant emphasizes the consistency and uniformity of results which can be obtained by this process. Subsequent installations in the course of manufacture for Gloucester Foundry Ltd. and G.K.N. (Cwmbran) Ltd., include more up-to-date features, providing the latest form of continuous annealing.

METALECTRIC FURNACES LTD.

SMETHWICK · ENGLAND

for all forms of electric heat treatment

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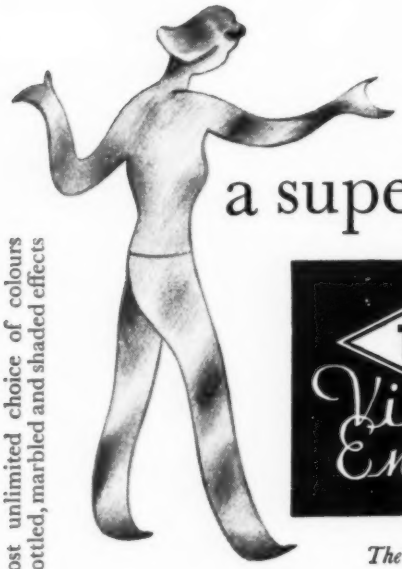
Metal can be given an infinity of attractive shapes Our job is to give it a superlatively attractive and protective *surface*



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The Rustless Iron Co. Ltd.
Keighley, Yorks.
Telephone: 3737

For full details of this smooth durable, hygienic, heat-resistant labour-saving surface for Heating Cooking, Washing and Lighting Equipment, get in touch with the foremost VITREOUS ENAMELLERS

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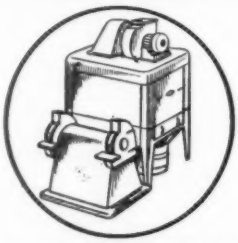
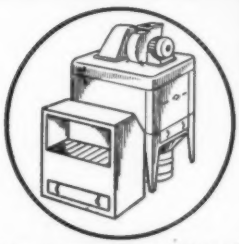
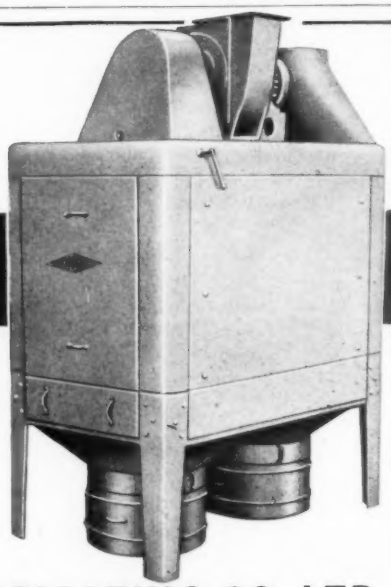
FLOODGATE

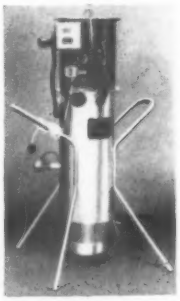
FLOODGATE SCREEN TYPE DUST COLLECTING UNITS



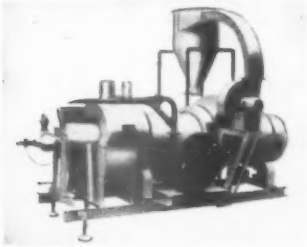




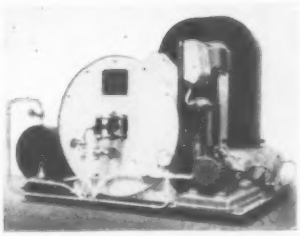
THE FLOODGATE STEEL FABRICATING CO. LTD.
758-786 KINGSBURY ROAD, ERDINGTON, BIRMINGHAM, 24
Telephone ERDington 6111/5
DUST & FUME EXTRACTION · WET & DRY TYPE DUST COLLECTORS · WOOD REFUSE PLANT
MANUFACTURERS OF ALL TYPES OF DUCTING



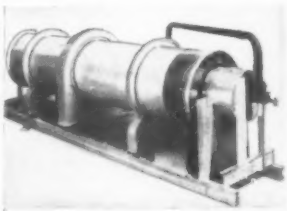
Axial Jet-M Hot Air Unit



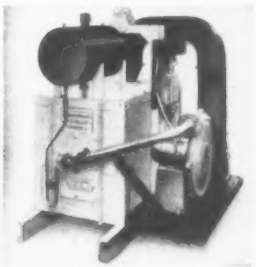
Sand Dryer and Cooler



Portable Oil Fired Mould Dryer

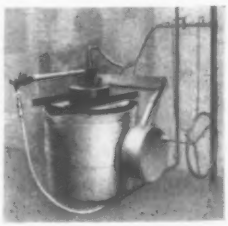


Sand Dryer, 1-10 tons per hr.



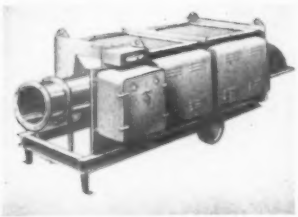
Oil Fired Mould Dryer

Vertical Core Stoves



Ladle Dryer

Ingot Mould Stoves



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Horizontal Core Stoves

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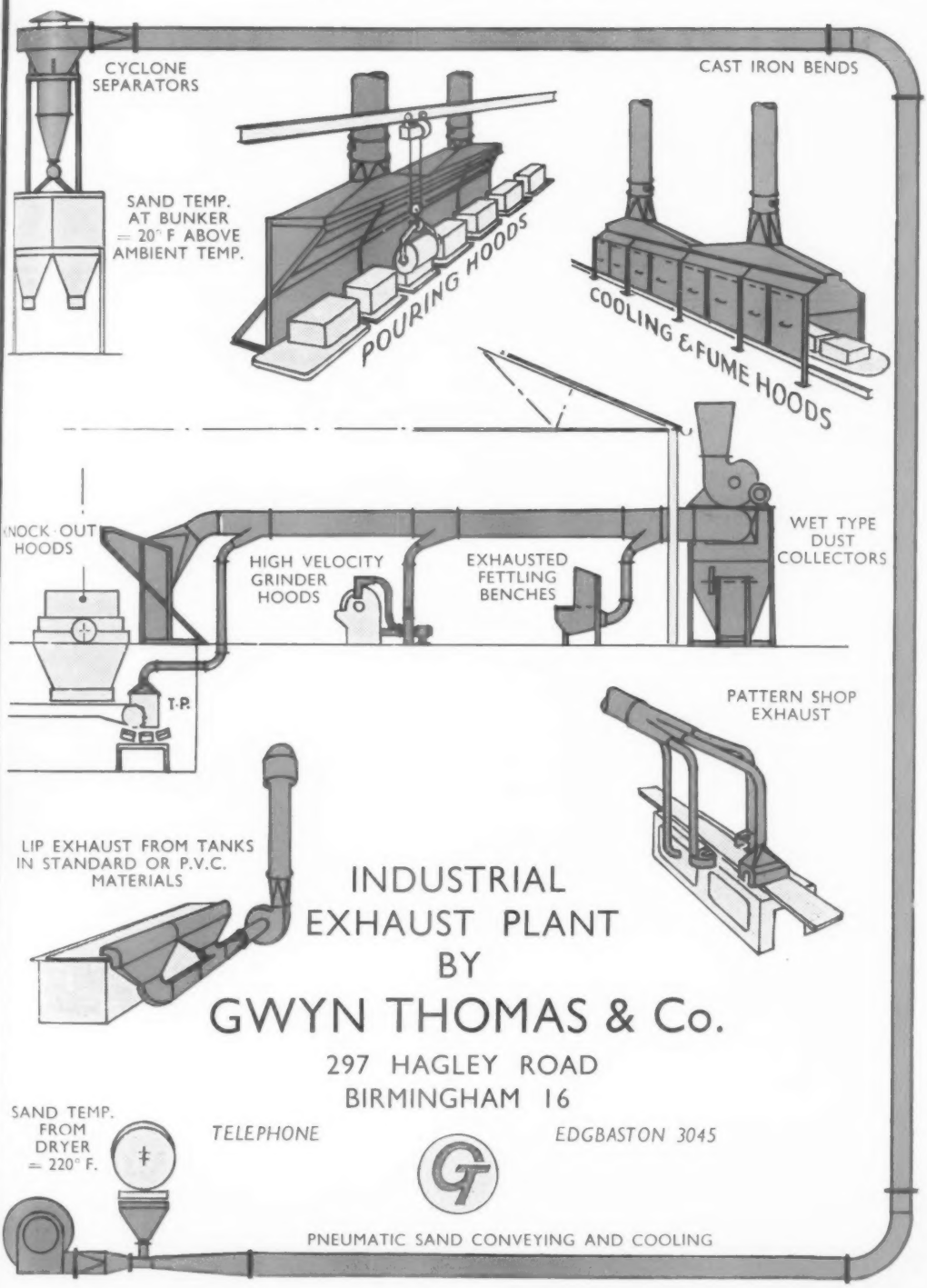
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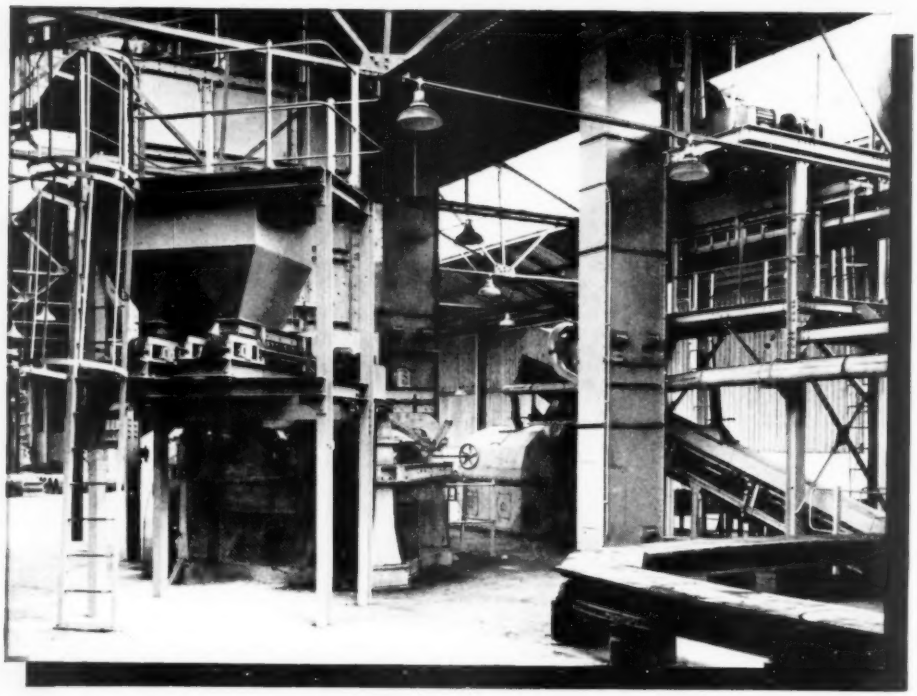

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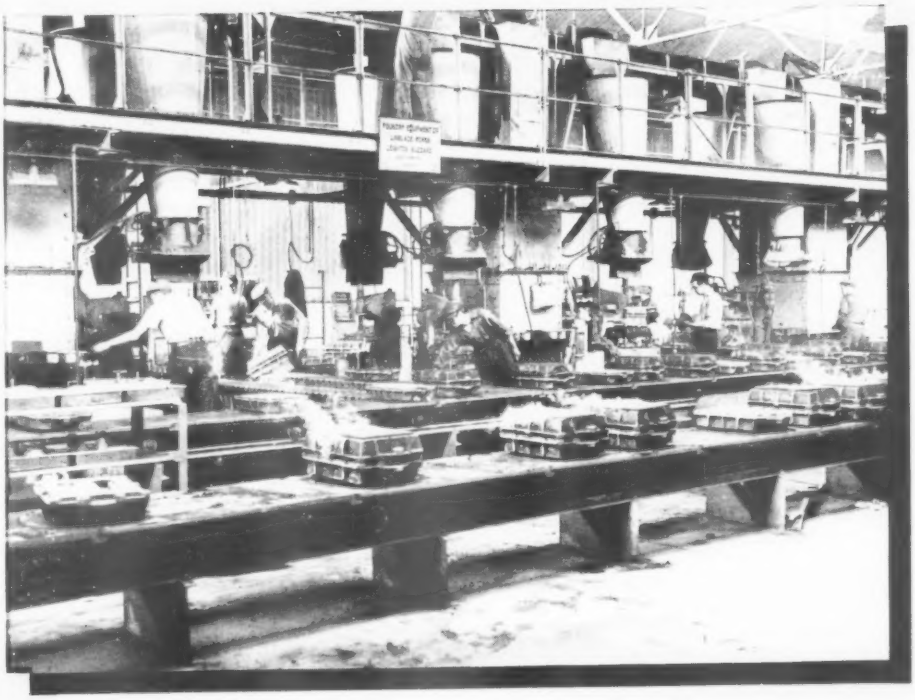

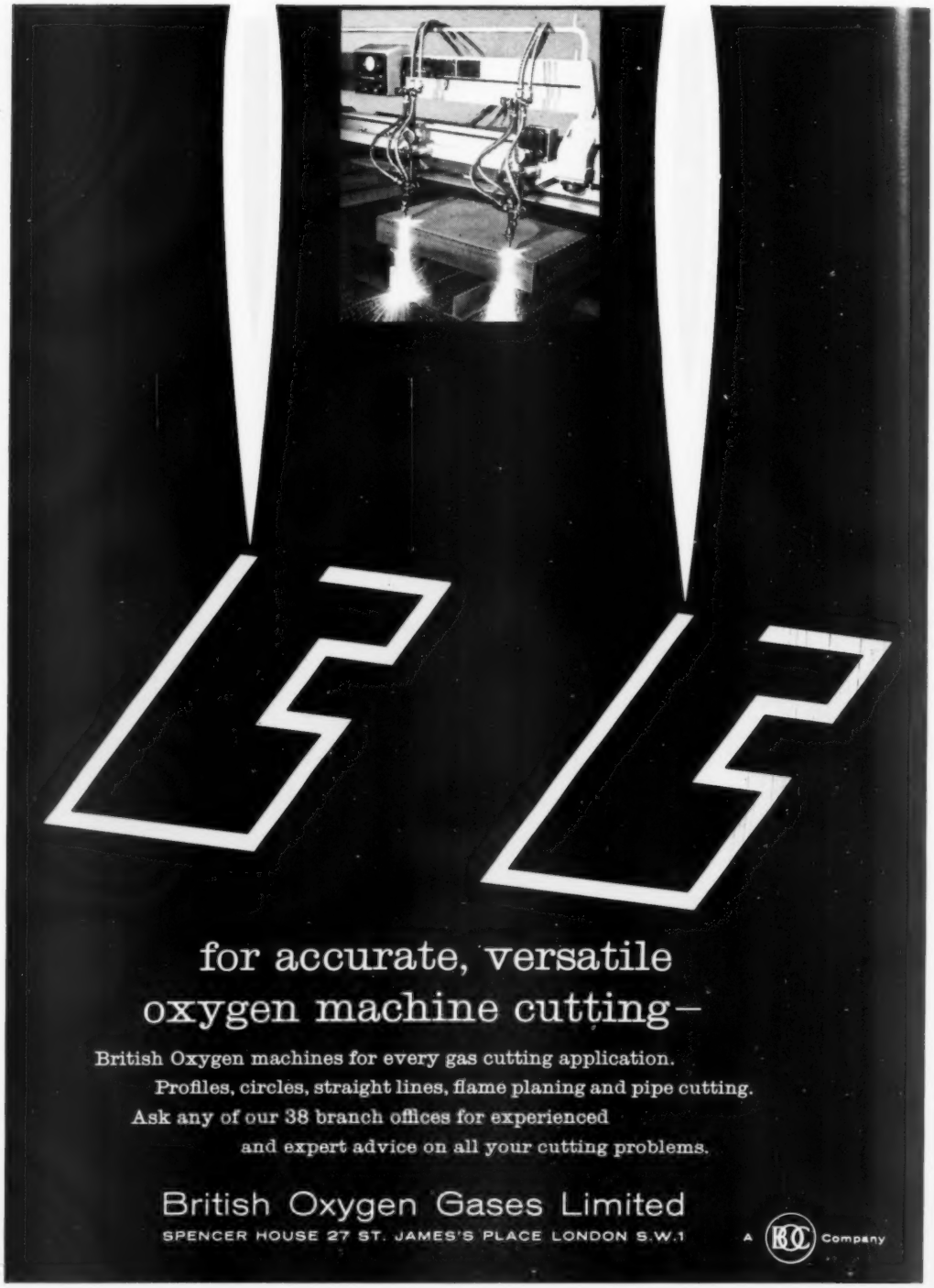

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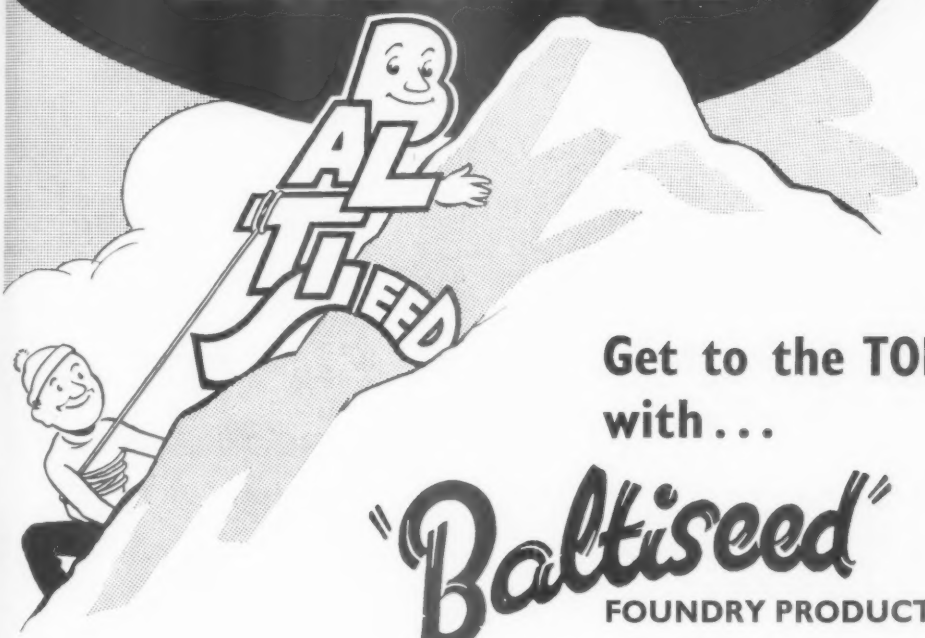

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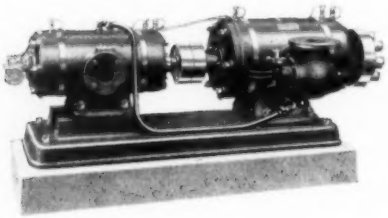

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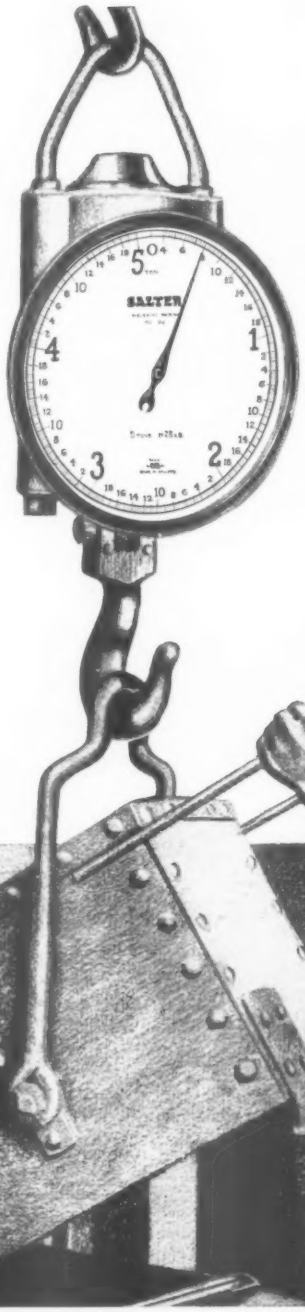

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Extract from 'Foundry Trades Journal'

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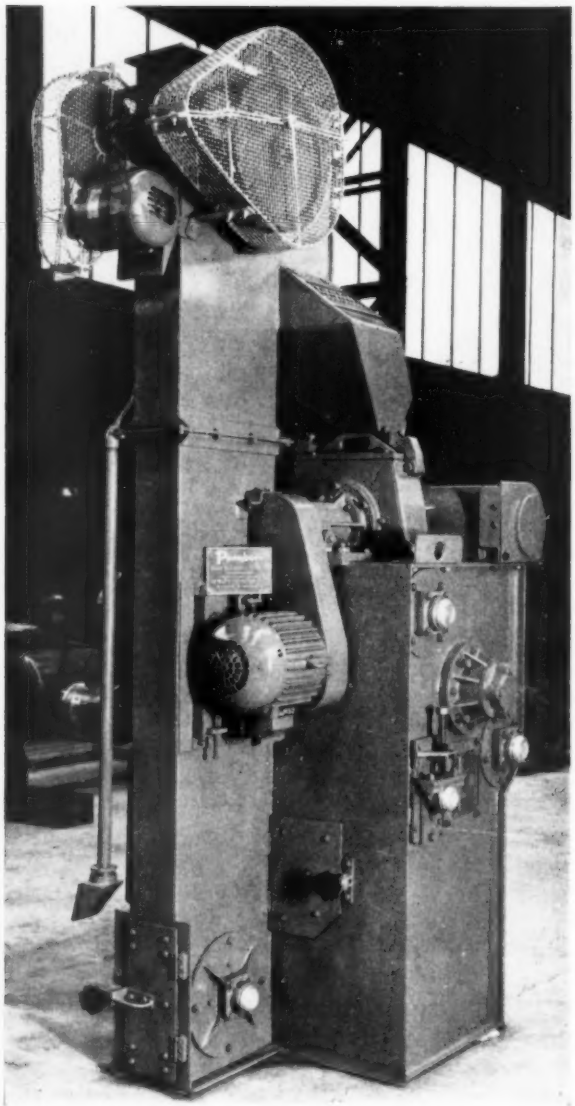

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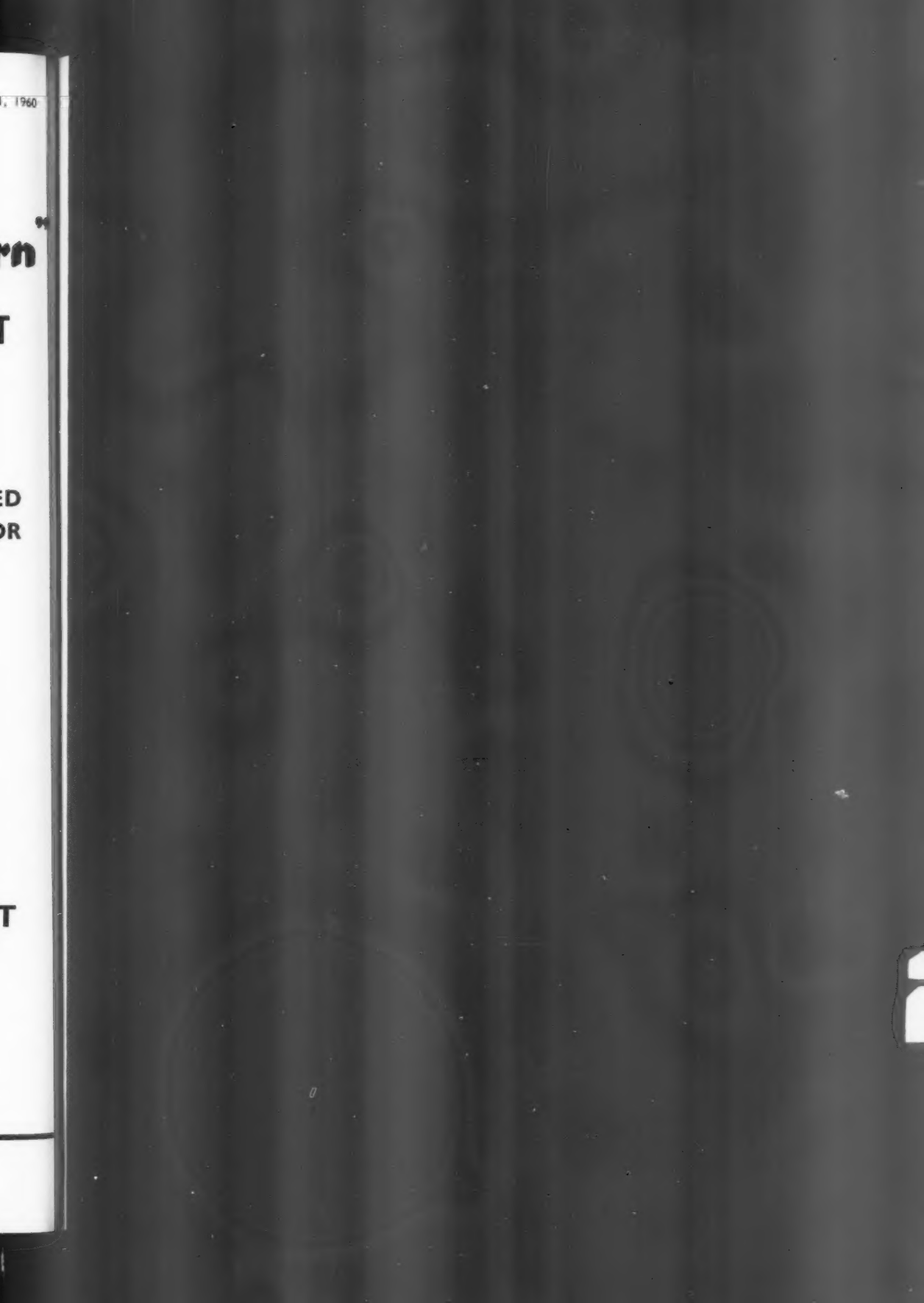

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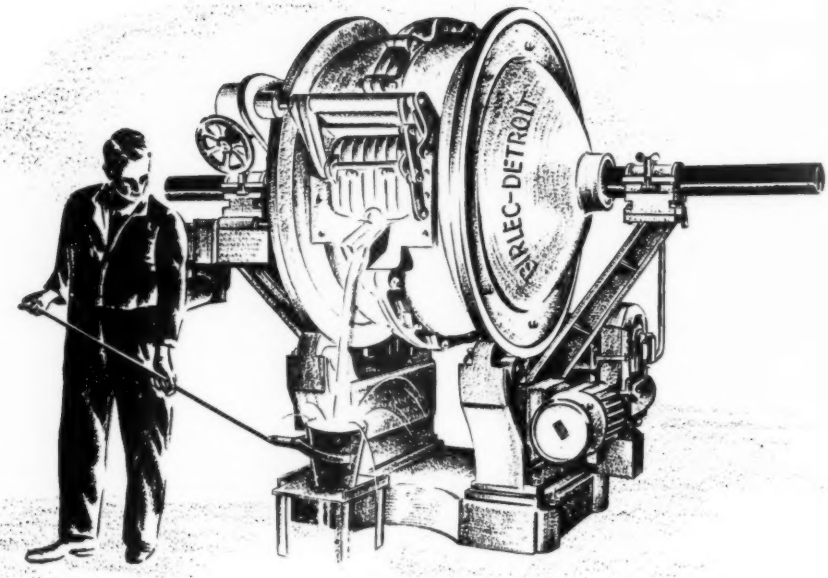

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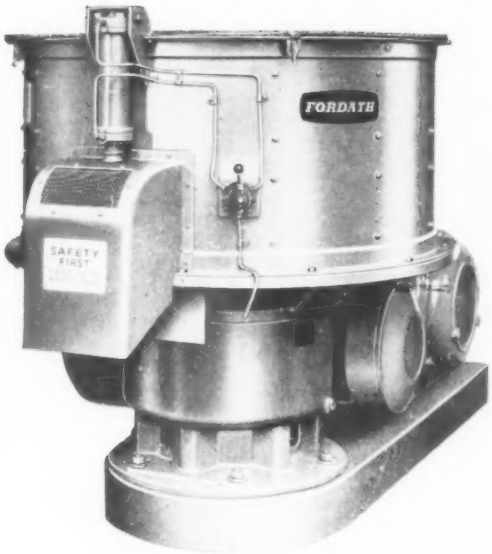

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Scottish Laboratories: Blantyre Industrial Estate, Blantyre, Lanarkshire. 'Phone 486.

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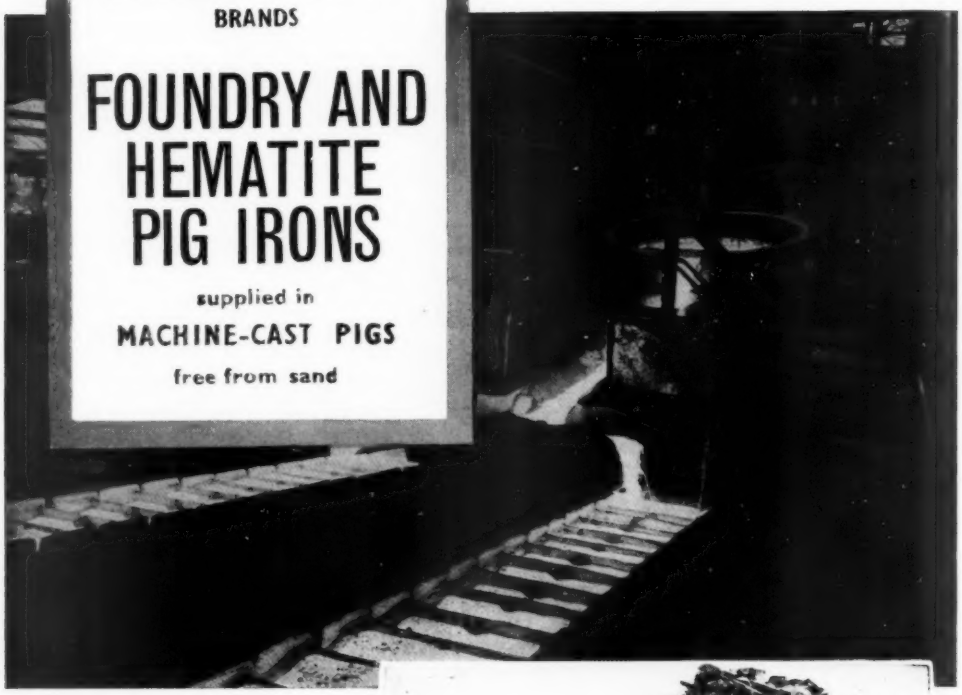

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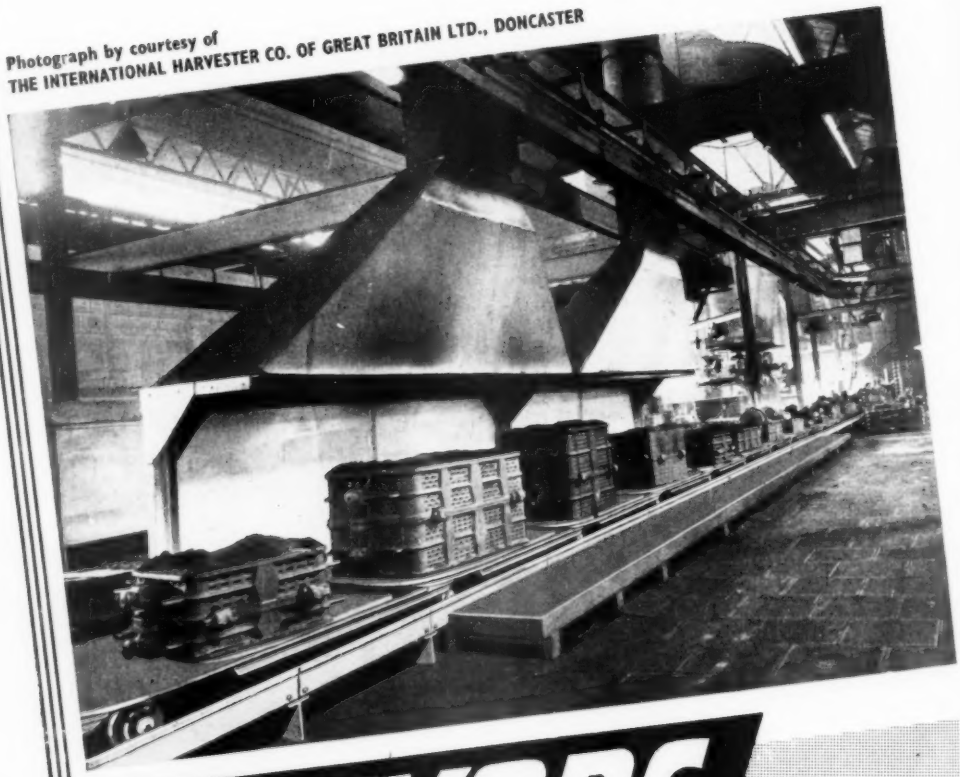

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European Free-trade Association

At the beginning of this month, a start was made towards the creation of a free-trade area in industrial goods among the " Outer Seven " countries—Great Britain, Austria, Denmark, Norway, Portugal, Sweden and Switzerland. This move consisted of a 20 per cent. cut in existing tariffs, and a further reduction of 10 per cent. is scheduled for January 1, 1962. By January, 1970, the whole tariff system among these countries for industrial goods will have been swept away.

None of the other countries signing the Stockholm agreement seems likely to export castings to the United Kingdom, although before the 1914 war, Swiss light cast-steel components had a ready sale. Since that time, however, there has been an equalization of quality throughout the world. Foundry plant is manufactured in both Switzerland and Sweden, but much of this is of American design and manufactured probably under restricted territorial arrangements. As a result of the tariff removal, however, foundry instrumentation equipment may enter this country in larger quantities, as at least one of the associated countries has a high reputation for light precision-engineering. To set against these imports, there would seem to be a good chance of increased exports from the UK of bath castings, but unless the design is modified to suit the various overseas markets, it will be difficult for UK founders to enter the equivalent markets for cookers and space-heating stoves, as each country well knows how to cater for its own needs. There is a limited business available in Scandinavia for ingot moulds, which are at present being supplied from Germany, and in recent years this country has been supplying malleable castings to the Swedish automobile industry. Patterns are being exported from the UK to Sweden and Portugal, as well as to Germany, Jugoslavia and other countries.

The major benefits to British founders to be expected from the tariff removal are likely to come from their customers for machinery castings, as the relief given by reduced tariffs should help in the export of this class of goods. Especially do we expect increased sales among the " other six " abroad of dairy machinery, motor-cars, lorries, tractors and the like. The lowering of the tariffs has come at a time when most of our factories are working to near capacity—associated with an " easy " home-market—but it should be borne in mind that efforts made now will prepare the way for the promised easier trading conditions consequent upon the progressive lowering of tariffs. The two countries to which we recommend special attention should be given are Austria—a traditional German market—and Portugal, where again increasing competition with British industrial plant has been felt over the last few years.

IBF National Works Visits Day

For the eleventh year in succession, the Institute of British Foundrymen is to hold a National Works Visits Day and this year the Sheffield branch has made the necessary arrangements. These works visits supplement the arrangements already made by branches, and those afforded at the annual conference, and in particular enable members who cannot spare the time to attend the whole of the conference to take part in an annual national gathering.

Programme

The visits, which will take place on Friday, October 28, have been made possible by the kind agreement of nine important founders in the Sheffield area and a research association to receive parties of members, and any one of the five pairs of visits may be chosen. The schedule of visits is shown in Table 1.

TABLE 1.—*Works to be Visited in the Sheffield Area.*

Party	A	Osborn Precision Castings, Ltd., and Osborn Foundry and Engineering Co., Ltd.
,,	B	Newton Chambers & Co., Ltd., and the Brightside Foundry and Engineering Co., Ltd.
,,	C	English Steel Castings Corp., Ltd., and the British Steel Castings Research Association
,,	D	Hadfields, Ltd., and Millspaugh, Ltd.
,,	E	Staveley Iron and Chemical Co., Ltd., and Sheepbridge Engineering Co., Ltd.

Members are asked to indicate on a reply form which of the visits they prefer to attend and—as the number permitted in each party is strictly limited—their second and third choices. Coaches will leave from the City Hall, Sheffield, at the following times:—For visits "A" and "B," 9.30 a.m., "C" and "D," 9.45 a.m., and "E," 9.15 a.m.

Dinner

In the evening there will be a dinner and entertainment at the Grand Hotel, Sheffield. The charge for each pair of works visits, including transport by coach, luncheon, gratuities and administration expenses is 21s., and the additional charge for dinner in the evening at Grand Hotel is 25s. Members who wish to participate are asked to return the application form to the Institute of British Foundrymen, 14, Pall Mall, London, S.W.1, not later than September 30, earlier if possible. Those who find it necessary to stay in Sheffield overnight are required to make their own arrangements for hotel accommodation, and are advised to book as early as possible. A list of hotels is available from the Institute.

Outlook for British Exports

In its July issue, the *G.E.C. Export Guide** forecasts the prospects for British exports to 34 major markets of 36 product groups. The "outlook for British exports" for the period July to September, 1960, is "good" in 23 countries, "improving" in six, "deteriorating in two and "unchanged" in three. There are no "bad" markets among Britain's main customers. "Outlook for British exports" since April, 1960, has improved in Finland, Malaya and Singapore, Pakistan, Portugal and Venezuela. Prospects are less favourable in Belgium.

* Issued by the economic and marketing research unit of the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2.

BISRA New Research

Foundrymen will agree that experience has shown that poor design of metal objects and structures can lead to serious damage through corrosion. Typical faults that lead to rusting are the formation of enclosed areas which serve as traps for condensed moisture, horizontal surfaces on which water can lie, and design details which cannot be reached for maintenance purposes.

The problem is clearly of practical importance and the Corrosion Committee of the British Iron and Steel Research Association has, therefore, decided to investigate it. The scope of the research will be wide and will relate to structures and assemblies of all kinds. Moreover, the term "design" will be liberally interpreted so as to include not only design proper, and general layout, but also the choice of materials and of protective schemes. Structures will first be classified by type and environment; then examples of each type will be inspected from the point of view of corrosion design. Any undesirable features will be listed and practicable alternatives will be checked in consultation with engineering experts, and by experimental work, coupled where possible with service trials. It is hoped, as a result, that a code of recommendations will be published.

The investigation is of interest to architects, designers, and engineers in many fields. Equally, their specialized knowledge and experience will help the investigators, who welcome suggestions and comments on their proposals. Founders who wish to co-operate in this research should address communications to the technical secretary, Corrosion Committee, BISRA, 140, Battersea Park Road, London, S.W.11.

Iron and Steel Institute Award

The Council of the Iron and Steel Institute has established a new gold-medal award, to be known as the "Medal of The Iron and Steel Institute." This medal is to be presented on special occasions to societies which have, in the opinion of the Institute's Council, rendered exceptional service to science or industry over a lengthy period. The first award of the medal is made to the Royal Society, in recognition of its unique service to science over a period of 300 years. It was presented by the Hon. R. G. Lyttelton, past-president of the Institute, at the tercentenary celebrations of the Royal Society last Monday.

BIM Conference

At the 1960 National Conference of the British Institute of Management Sir John Hunt will give the opening address in Harrogate on October 11. Topics discussed at the conference will include "The Restrictive Trade Practices Act," "Pay Differentials," "Automation and the Older Worker," "Movement of Industry—Local and National Factors," "Restlessness in Management Trainees," "The Accountant in Management," "Inventiveness—the Most Important Tool of Management" and "Training Young Workers."

PYGHTLE (BEDS) WORKS of John P. White & Sons, Limited, has been acquired by W. H. Allen Sons & Company, Limited, mechanical, hydraulic, and electrical engineers, also of Bedford. The property covers 3½ acres and adjoins the main works of W. H. Allen. The company intends to transfer the manufacture of electrical-control gear from its Biddenham works.

British Steel Castings Research Association: Annual Report, April 1, 1959 to March 31, 1960

The following extracts from the BSCRA seventh annual report cover the recent extensions to the Research Station, the work carried out by the Association's Steel Castings Development Committee and give details of the special assistance-to-industry scheme. The first part of the Report concludes with a note about the Association's external relations and particulars of its information and advisory service. The second part surveys research and sections dealt with include steelmaking; foundry processes; materials and metallurgy.

The past year for the British Steel Castings Research Association has been notable in several respects. It has been the first year of the Association's second quinquennium of the Department of Scientific and Industrial Research grant aid when new terms have been operative; it has seen the completion of the first extension to the Research Station; a new service has been launched to assist the industry in the application of the results of research, and there has been a marked increase in interest and support for the work of the Association from a number of sources.

The extensions to the Research Station, which have resulted in the addition of 10,000 sq. ft. of laboratory and foundry floor space, have greatly eased the congestion which will have been apparent to members visiting the laboratories in 1958. These extensions have comprised the addition of a first floor to the "office" building and a lengthening of the foundry and laboratories building. The metallurgy laboratory has been transferred from the foundry building to the first floor of the office building, where a new gases-in-steel laboratory has also been established, together with offices for the research section heads and a more spacious conference room. In the foundry building, the foundry bay itself has been lengthened by some 45 ft., the machine-shop and the mechanical-test laboratory have been enlarged, the sands laboratory and the chemistry laboratory have been resited and substantially enlarged, and an isotope laboratory has been installed. Additional storage space and a staff mess-room have also been added to this building.

The main items of equipment being installed in these extensions comprise a 56-lb. capacity vacuum melting furnace of G.E.C.-Viavac manufacture; apparatus for the determination of hydrogen, nitrogen and oxygen in steel, and a 2.5 Curie caesium isotope source and handling equipment. A fettling bench of the BSCRA patented design, incorporating features for dust and noise control, has been provided on permanent loan by Newton Collins, Limited, one of the licensed manufacturers.

Development Committee

The Association's Steel Castings Development Committee is at present proceeding in the following directions: (*a*) It has approved an investigational programme prepared by the BSCRA and to be undertaken by them in three stages for the supply of data on the physical properties of cast steels (details are provided in Part II of this report); (*b*) it has commissioned the writing, by members of BSCRA staff, of notes for a series of eight lectures on the design and properties of steel castings for the guidance of teachers in technical colleges. These notes will be supported by suitable visual aids. (*c*) It is proposing to stimulate a larger volume of lectures on the engineering applications of steel castings to local engineering societies, and possibly also the major engineering institutions.

The Committee has had the benefit of reports from the director and the secretary of BSCRA, respectively, on product development activities of the steelfounding industry in the USA, and on corresponding activities in other metallurgical fields in the United Kingdom, and is assessing these in relation to the scale of its own activities.

Special Assistance Scheme

It was reported last year that the DSIR had made an offer of special grant to the research associations for three years in support of activities extra to their normal programmes, which are aimed at improving the rate of application of research results in industry. In view of the direct value of such work to BSCRA members, and the exceptionally favourable terms offered by the department, the Council had no hesitation in recommending members to make the small additional contributions necessary to attract this grant, and in instructing the director to plan a corresponding programme of improved liaison services. The response from the membership has been most gratifying both in terms of financial support and interest in the new activities and, as a consequence, the Association is now in receipt of additional income at the annual rate of almost £7,000. This has made possible the recruitment of three additional members of the senior scientific staff.

These arrangements were completed in time for the inauguration of the scheme as at October 1, 1959, since when all ordinary members have had the opportunity of informing the director of the projects and services in which they have special interest. These include: (*a*) Assistance in the application of research which has demonstrated the practicability of achieving more efficient usage in the making of plain carbon steels. (*b*) Assistance in studying the practicability of applying short-time

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heat-treatment cycles under the varying conditions found in industrial heat-treatment furnaces. (*c*) Assistance in applying the benefits accruing from work-simplification studies, and (*d*) improved liaison with members through more frequent visits from members of the senior research staff, and an extension of the Association's programmes of meetings, demonstrations and training courses.

There has been close collaboration with H.M. Alkali Inspectorate in the matter of atmospheric pollution from steelfoundry melting furnaces, and this will continue until a solution to the problem is found which is satisfactory to the industry and the Inspectorate. Contact with the Inspectorate is maintained principally through the Working Party set up jointly with the British Steel Founders' Association, to which reference was made last year, but of special importance to the industry was the statement of policy made by Dr. E. A. J. Mahler, deputy chief alkali inspector, at the BSCRA Conference on January 27, 1960. Investigational work is proceeding at the Research Station and in collaboration with members with a view to determining the best practicable means of complying with the Inspectorate's requirements.

The Factory Inspectorate and the appropriate trades unions continue to be advised of relevant research activities of the Association through the Joint Standing Committee on Conditions in Steel Foundries, and this was supplemented by arranging for representatives of four trades unions to visit the Research Station on March 30, 1960, for the purpose of inspecting work in progress. The party was welcomed by the chairman and accompanied on their inspection by members of the Council. The unions represented were: Amalgamated Union of Foundry Workers; Iron, Steel and Metal Dressers and Kindred Trades Society; Amalgamated Moulders and Kindred Industries Trades Union; and United Pattern Makers Association.

The arrangement initiated last year, whereby the Association provides accommodation and secretarial services to the British Investment Casters' Technical Association, has continued on a mutually satisfactory basis.

Information and Advisory Service

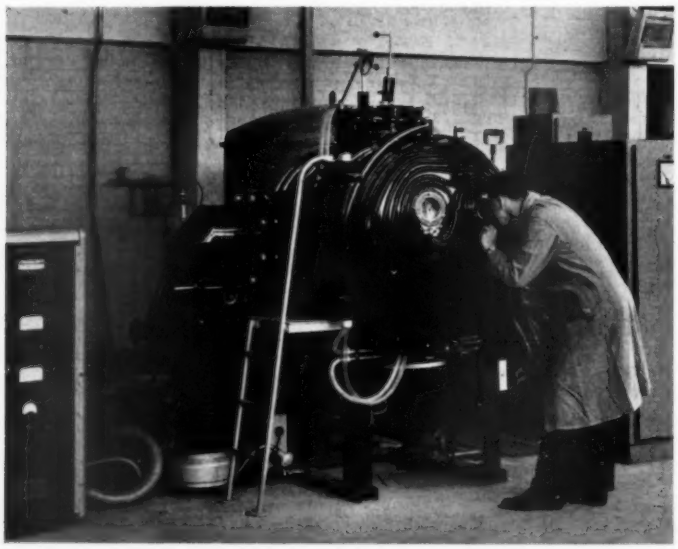
Coverage of the world's published literature on steelfounding and related subjects continues to be provided by the information section, whose services are increasingly used by members, not only by means of loan requests arising from items in BSCRA *Abstracts*, but by independent enquiries at the rate of 500 per annum over a wide range of subjects. Library loans to outside borrowers have increased this year by 35 per cent.

It has been noted by the Association that communication arrangements within some member companies, and not exclusively the large ones, are such that information about the Association's work does not always reach the less senior supervisory staff to whom it is often of the greatest value. As a consequence, instances have been not uncommon of the Association's work being duplicated or ignored in member foundries. The remedy for such cases clearly lies in the hands of the individual members, but the Council does remind members that they are each entitled to ask the Association to supply any reasonable number of copies of its publications and to arrange personal meetings with the Research Association whenever this is thought likely to be of advantage.

RESEARCH: Steelmaking

Oxygen Injection.

Oxygen Injection for Carbon Removal.—The validity of the Association's control charts—which define, for various bath temperatures, the amount of oxygen to be injected to produce a predetermined reduction in the carbon content—has been substantiated by further foundry trials. Since adequate oxygen-metering equipment is necessary to apply the results of this work to routine steelmaking in foundries, a survey has been made of the various instruments available for this purpose. By using a pressure-regulating valve and a simple integrating meter, it is possible to provide adequate metering facilities for as little as £130. A series of demonstrations and discussions in member



Vacuum electric induction furnace of 56-lb. capacity recently installed by G.E.C.-Viavac in the laboratories of the British Steel Castings Research Association in Sheffield.

foundries has been arranged in order to further the application of this technique which in many foundries offers the possibility of considerable economies in the use of oxygen and re-carburizing additions.

Phosphorus Removal During Oxygen Injection.—Earlier work had shown that phosphorus can be very effectively removed during oxygen injection by the simple expedient of injecting oxygen at low metal temperatures and maintaining a highly-basic slag and a low temperature by additions of limestone. Unfortunately, in steelmaking by the double-slag process, there was a considerable reversion of phosphorus to the steel during the period that follows oxygen injection in which the bath is kept under a reducing slag to secure the removal of sulphur. Experiments have continued during the year to minimize this reversion of phosphorus by double-oxidizing slag techniques, the first oxidizing slag being removed prior to oxygen injection under a second oxidizing slag. Reversion of phosphorus during the reducing period has, however, still been troublesome, even with double slags and efficient deslagging.

Desulphurization of Liquid Steel

Work has continued on the "reversed slag" process, developed during the previous year. In this process the steel is melted under a reducing slag and the bath rabbled by a stream of nitrogen to promote slag metal contact and to quicken the process of desulphurization. The reducing slag is then removed and replaced by an oxidizing slag; oxygen is injected to remove carbon, the oxidizing slag pulled off and the heat finished as quickly as possible under a thin protective reducing slag cover. By this means, it is possible to produce steel with a low sulphur-content without the risk of serious pick-up of hydrogen, which is associated with long periods under a reducing slag.

This process has worked very successfully in the Association's 6-cwt. steelmaking furnace and steels have been produced containing as little as 0.004 per cent. S. Gas estimations have shown that there is no significant increase in the nitrogen content of the steel and that the hydrogen content drops both during the nitrogen-injection period and during subsequent oxygen-injection so that the hydrogen content of the cast steel is lower than that of steel of a similar sulphur content made by the conventional two-slag process. Mechanical tests of steel made by this process have been entirely satisfactory.

Works trials have been carried out on this process, but these have not proved entirely satisfactory. Although it was confirmed that the nitrogen and hydrogen contents of steel made by this process were low, trouble has been caused by the reversion of sulphur during and after the oxidizing period. There is strong evidence to suggest that this sulphur is picked up from the hearth and banks of the furnace. The foundry furnace in which these trials were made had a dolomite hearth, whereas the research furnace in which the trials were successful was lined with magnesite. There are valid chemical and thermo-dynamic reasons that suggest that reversion may be more troublesome with a dolomite hearth and experiments are to be made in the research furnace with a dolomite hearth to determine the influence of this variable. Experiments are also in hand to increase the efficiency of sulphur removal by the injection of powdered materials with a high affinity for sulphur with the nitrogen stream.

Pinhole Porosity

The object of this project is to correlate the incidence of pinhole porosity with steelmaking, moulding, and atmospheric variables and by so doing to try to suggest a mechanism of pinhole formation that will fit the information so obtained.

A test casting has been developed which can be made free from pinholes when desired and at present work is proceeding to ascertain the effect of steelmaking variables on the incidence of pinhole porosity.

Work on this project will be facilitated when facilities for gas analysis become available at the Research Station during the coming year.

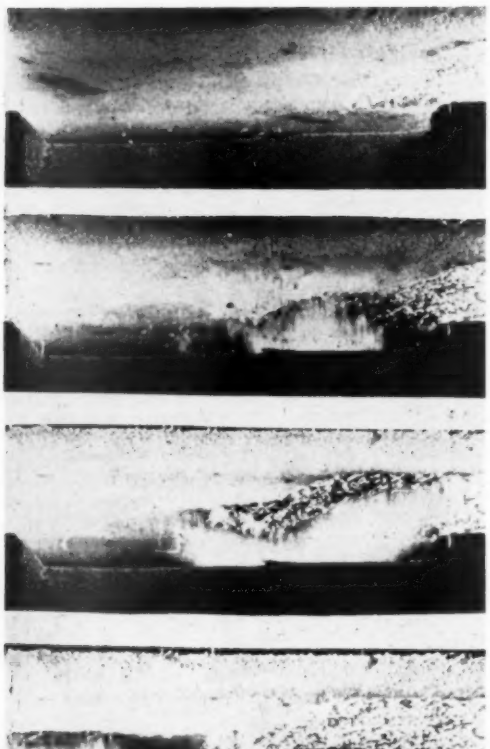
Foundry Processes and Moulding Materials

Factors Affecting the Surface Quality of Steel Castings

Mould Paints and Washes.—Considerable progress has been made with this work, which has been mainly concerned with factors affecting the cracking propensity of paints both on drying and under the influence of thermal shock heating. Cracking during the drying stages has been shown to be affected by a number of factors other than the presence of clay in the wash, viz., sand ramming-density, sand dry-strength, excess suspending agent, the incorporation of very fine powders as a filler, and the addition of inorganic bonding agents. Replacement of the bentonite suspending agent by sodium alginate has been shown to minimize this defect to a considerable extent.

Investigation of painted sand compacts rapidly heated to high temperatures (1,350 deg. C.) has shown that all bentonite washes, irrespective of the refractory base, crack or spall to some degree if sufficient bentonite is present to give adequate suspension properties. This was especially noticeable when they were applied to sand mixtures of low dry-strengths. Paints using sodium alginate as a suspending agent in the correct quantity did not crack when applied to a well-graded sand and it has been possible to define critical ranges of viscosity and specific gravity to give optimum coating-thicknesses for various methods of application.

Casting trials with the test casting developed for this purpose—in which the effects of high ferrostatic pressure can be simulated—have indicated that, providing a thick thermally-stable refractory layer of zircon, silica, alumina or magnesia lies between the molten steel and the sand, then metal penetration under conditions of high ferrostatic pressures can be eliminated. The trials have also suggested that paints based on materials giving a sand/paint reaction, e.g., olivine and titania, offer



Cine film is used in the laboratories of the British Steel Castings Research Association to observe and record thermal-shock effects on mould materials used in the production of steel castings. This sequence shows the mechanism of the formation of a scab on the top face of a mould during pouring with molten steel. With the particular sand mix employed here, the effect of the heat radiated on to the sand from the rising metal is to cause first the "raining" down of individual sand grains, followed by the separation of thin crusts of sand from the mould face. This gives rise to the scabbing defects which are sometimes encountered on the upper face of castings.

little resistance to metal penetration under these conditions.

The room temperature properties of inflammable type mould washes have also received some attention and a number of colloids suitable for gelling alcohols have been studied. Of these, bentones (organic clays) have been found to be satisfactory for alcohol mixes containing small amounts of non-polar solvents to improve gelling efficiency. Amine alginates are useful as gelling agents for cheaper grades of isopropyl alcohol. As a result of this work it has been found possible to formulate inflammable washes with adequate suspension-properties which give good, hard, crack-free surfaces on drying. It it now proposed to carry out trials in member foundries to determine how far the findings are applicable in practice.

The penetration test casting is also employed to give information on the actual mechanism of metal penetration, *i.e.*, the speed of penetration, how metal penetration affects the thermal conditions in the sand, and on the effect of varying ferrostatic pressure upon the depth of penetration.

Factors Affecting the Erosion of Moulds by Molten Steel.—A study has been made of the erosion of a thin vertical plate, the sides of which are formed by two cores made of the sand under test. Tests were carried out on sands bonded with sodium and calcium bentonites compacted to various bulk densities and the erosion was determined by measuring the surface roughness of the casting. The amount of erosion is related to the density of the sand compact and to the type of bentonite which is used to bond the sand. Cereal additions have been found to be beneficial in minimizing erosion in that they allow the sand to be rammed harder without causing expansion defects. The method of determining erosion by comparing the surface roughness of the cast surfaces is now not considered to be satisfactory. The method is not quantitative and other factors, e.g., variations in the grain size of the sand, affect the degree of surface roughness. For these reasons the test casting has been modified so that the erosion can be measured by the increase in weight of the eroded plate.

A complementary test is being developed in which a sand specimen is repeatedly oscillated through 90 deg. while immersed in a bath of molten metal. Both these tests show promise of being quantitatively satisfactory.

Friability of Green-sand Moulding Mixes on Air Drying.—Friability tests on air drying have been carried out on a series of sand mixes and quantitative correlations have been made between friability and (*a*) the original moisture content of sand, (*b*) the amount and nature of the bonding clay addition, (*c*) the degree of ramming, (*d*) the addition of wetting agents and other substances, and (*e*) the effect of surface sprays. An attempt is now being made to correlate friability with other sand properties and with the speed of drying of the sand.

CO_2/Sodium-silicate Process

Work on the collapsibility of CO_2/sodium-silicate mixes by hot-tear tests in collaboration with

the North-East Coast Association of Steel Founders Regional Technical Committee has been completed. This has resulted in the development of a hot-tear test-casting which gives consistent results within individual foundries and which can be used to determine the factors affecting tearing, e.g., moulding and metal variables, under individual foundry production conditions. It has been found that:—(*a*) The propensity towards hot-tearing is no greater with CO_2-Process sand than with normal clay-bonded dry-sand mixes; (*b*) the addition of organic materials to CO_2-sands does not improve their collapsibility at high temperatures and in fact can increase the severity of tearing in castings of relatively-thin section, and (*c*) the addition of a small amount of clay to a straight silicate-bonded sand sand may reduce or prevent tearing.

Some inconsistencies were observed in the practical foundry trials and the reason for these was sought. It was found that they could be accounted for by variations in the intensity of milling, the degree of ramming, and the pouring temperature, all of which can affect the severity of hot-tearing. In the laboratory, work is continuing to determine the affect of clay and other additions on the retained strength and ease of knock-out of CO_2-sands after casting. A suitable test-casting has been developed in which the ease of knock-out of CO_2-sand cores is assessed by vibration of the casting under controlled conditions and the degree of removal of the core measured.

Mould and Core-bonding Agents

A number of air-setting, clay-tolerant oil binders for moulds and cores have been examined. The tolerance of oils to type and amount of clay has been investigated as well as the bench life of the mixes and the amount of gas evolved during their breakdown. Fluidity spiral tests have shown beneficial effects on the surface finish of 13 per cent. Cr steel produced by the air-setting oil binders. No marked increase in the rate of hardening of the oil-bonded cores could be achieved by gassing with oxygen. Other binders examined include aluminium ortho-phosphate solutions and a special polyacrylamide binder which, it was claimed, could replace cereal aditions to a sand mix with a resulting improvement in bonding and moulding properties. These claims, however, have not been substantiated by tests carried out by the Association.

Flowability and Compaction of Moulding Sands

Work at B.S.C.R.A. Laboratories.—The problems of flowability and compaction are being investigated by studying the effects of grain size and grain-size distribution on the packing density of a silica sand when compacted under standardized conditions. The work to date has been confined to 3-sieve sands comprising various proportions of grain diameter ratios, d: 0.4d., and 0.2d. or 0.15d. These diameter ratios are based on calculated maximum packing densities for spheres where the 0.4d. particles just fill major voids between the larger spheres, and the 0.15d. particles are just capable of passing through the "throats" of the primary spheres. It has been found that the maximum bulk density for dry, clay-free sands was obtained with the composition, d. 70 per cent., 0.4d. 5 per cent., and 0.15d. 25 per cent. As this blend became coarser the higher became the bulk density. The addition of 3 per cent. moisture to the blends gave a marked decrease in packing density and the effects of adding bonding clays to such sands are now being investigated.

Work at Sheffield University.—This work has been concerned with studying the plastic behaviour of clay/water films and in trying to relate this with compaction properties when the clay is mixed with sand. Using a sensitive shear plate viscometer, stress/strain curves for various clays have been determined dynamically. It has been found that whereas the stress/strain curve obtained with a bentonite is independent of the rate of straining, the higher the rate of strain imposed on a ball clay, the lower is its ultimate strength, and the more brittle does the clay film become. Attempts have been made to relate these results with those from a laboratory-scale jolting machine to provide a measure of the variation in bulk density with the number of jolts. The effect of clay-film thickness, the clay/water ratio, and the grain size of the sand on "joltability" have been studied. In general, it has been found that the factors most affecting compaction are the viscosity of the clay/water film and the type of clay. If the viscosity of the clay/water film can be altered, *e.g.*, by additions of Na_2CO_3, then the compaction properties of the clay/sand mix are also changed.

Metallurgy

Microporosity in Steel Castings

Semi-microradiography, and assessment of microporosity by point counting the micro-defects so revealed, has proved to be a valuable technique in the investigation of microporosity and is being used to study the variation of microporosity with freezing range and superheat in a series of steels of controlled composition. It has been shown that high-phosphorus contents can induce a fine crack-like type of microporosity in sections too small for the defect normally to occur. The effect of phosphorus, therefore, and also of sulphur is being determined in the series of steels now being investigated.

Castings fed by compressed-air risers have been subjected to mechanical tests, radiography, and semi-microradiography. In some cases, small improvements were noted in macro-soundness rather than micro-soundness, but in the majority of cases the application of compressed air did not result in a completely sound casting. In view of the difficulty in always ensuring no bridging over of columnar crystals in commercial castings, it is considered that the technique is unlikely to find wide application in steelfoundries.

Experiments to determine the effect on microporosity of vibration during solidification have been made. A practical difficulty was in finding a sand mould to withstand the effects of vibration; a CO_2-mould baked at 750 deg. C. was eventually

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used. It was found that when the degree of microporosity was small, vibration did not reduce its incidence, nor as a consequence did it improve mechanical properties. It was considered that vibration could never be applied to sand moulds in view of their tendency to collapse, and that the technique was of insufficient commercial or research interest to deserve further study.

Influence of Rare-earth Additions and Complex Deoxidant on Properties of Cast Steel

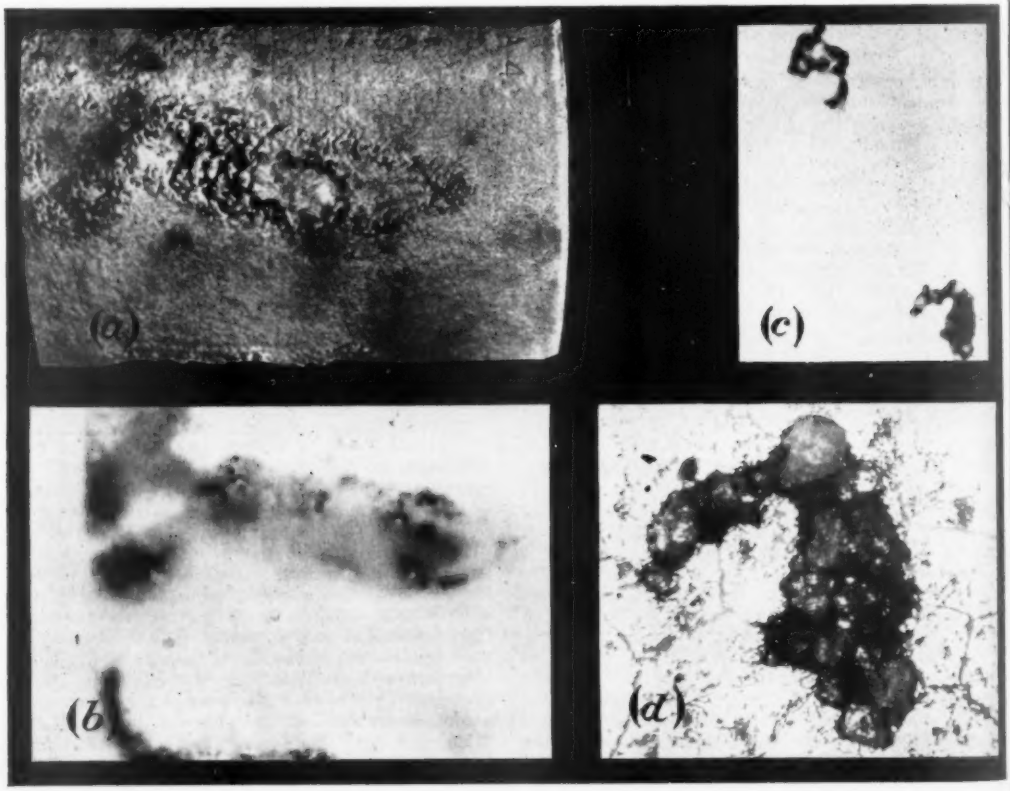
It has been established that, for medium carbon steel in the normalized condition, the low temperature impact properties are slightly and consistently improved by ladle deoxidation with aluminium and mischmetall and calcium/silico/manganese as compared with corresponding steel deoxidised with aluminium alone. The addition of mischmetall was without effect on the hardenability and consequently the welding properties.

Calcium alloys, with aluminium alone improved slightly the ambient-temperature tensile-properties and low-temperature impact-properties of both medium-carbon and low-alloy steels, while the further addition of mischmetall raised the maximum value of the impact energy transition curve, *i.e.*, improved the impact properties at ambient temperature and above. The mechanism of these improvements is not understood, but will be the subject of investigation with steels of carefully-controlled composition made in the new vacuum-melting furnace.

Heat-treatment of Steel Castings

Work has continued to determine whether economies in heat-treatment times can be achieved in foundry heat-treatment. This work has been assisted by the communication to the Association of

The erosion of sand moulds by molten steel has been traced in the laboratories of the BSCRA by means of auto-radiographic techniques, involving the coating of silica-sand grains with cerium-oxide. The ceria-containing sand-compact was then activated and placed in position in the erosion-test mould. The "ceroxide" type of inclusion at the surface of the casting is shown in (a). An auto-radiograph of an identical area (b) shows that this surface defect is radioactive. An auto-radiograph (× 12) of an inclusion immediately below the surface of the "ceroxide" defect appears in (c), and (d) is a photograph of the lower inclusion taken with polarized light (reduced by about one-quarter on reproduction).



the results of a comprehensive investigation on this subject conducted by the Steel Founders' Society of America. The effect of holding time at the austenitizing temperature, the choice of austentizing temperature on the tensile and impact (including those at sub-zero temperatures) properties of medium and low-alloy steel is being studied on castings of 1-, 3- and 5-in. sections.

The laboratory work on this subject is being supplemented by work in member foundries to study the behaviour of commercial heat-treatment furnaces of various types, before making recommendations about changes in heat-treatment procedures.

Surface Inclusions in Steel Castings

A method of labelling silica sand by coating the grains with CeO_2 and irradiating the sample in an atomic pile has been developed in collaboration with the Isotope Division, A.E.R.E., Harwell, and has been used to study mould-erosion during the pouring of a casting. The location of the eroded material was determined by auto-radiography of the sectioned casting. The auto-radiographs showed that the greatest amount of activity was located at the outside of the casting as surface defects. Further activity was located near the top and bottom of the shrinkage pipe and a little near the bottom face of the casting.

It was found that the inclusions that exhibited radioactivity consisted of relatively inactive grains of silica embedded in a non-metallic matrix, to which the activity had probably been transferred. It was considered most likely that these active inclusions were formed by reaction between the labelled sand and some non-metallic material present in the steel, e.g., slag or a deoxidant product. On the other hand, it appeared quite possible that similar, though inactive, inclusions could have been formed by reaction with initially active grains that had lost their activity, e.g., by losing their ceria through solution in liquid steel, or by reaction with other non-metallic material. Further work is in hand to elucidate the exact mechanisms concerned.

Relation of Crystal Orientation to the Results of Impact and Bend Tests

A design of test casting that gives a columnar crystal growth long enough to permit the machining of test-pieces from the columnar zone has been developed. Impact specimens machined along the major axes of the columnar crystals (and fractured across them) gave inferior results to specimens taken transverse to the columnar direction (and fractured in the direction of the major axes). From the bend-test results obtained, it was not possible to conclude whether the relation of the bending direction to the main columnar direction had any effect on the results. These tests are being repeated. Steels with higher-sulphur and -phosphorus contents have also been made and are being tested since it might be expected that the increased segregation would more markedly affect the results.

Physical Data on Cast Steels

Work is in hand on the collection of data on cast steels on behalf of the joint BSFA/BSCRA Steel Castings Development Committee. The scope of the programme is initially restricted to the low- and medium-alloy steels covered by British Standard Specifications. The tests that are being made include determination of mechanical properties on $4\sqrt{A}$ and $5.65\sqrt{A}$ test pieces, Young's Modulus, Charpy V-notch transition curves, Izod values, Jominy end-quench hardenability, density, transformation critical points, and coefficients of thermal expansion.

Data already available in the literature on cast austenitic steels are fairly extensive, and these also are being collected and summarized.

(*To be continued*)

Scottish Trade Group for Moscow

A trade group representing 10 Scottish companies has left for Moscow with the aim of increasing Scotland's share of British-Soviet trade. Organized by the Scottish Council (Development and Industry) and led by Lord Clydesmuir, who will also be representing Colvilles, Limited, of which he is a director, the party will spend a week negotiating with the Soviet Foreign Trade Corporation.

The visit is a sequel to the signing of the Anglo-Russian Five-Year Trade Agreement in May last year, when the Scottish Council considered the best way to to turn the new and improved conditions of trade to Scotland's advantage.

Among those going are Mr. L. Spiro, director of Harland Engineering Company, Limited, makers of centrifugal pumps, generators and hydro-electric plant, of Alloa; Mr. John D. Lloyd, joint managing director of Mavor & Coulson, Limited, manufacturers of coal-cutters, loader and conveyor equipment, of Glasgow; Mr. T. Storray, director of Mirrlees Watson Company, Limited, sugar machinery, pumps and condensing plant makers, of Glasgow; Mr. J. A. Keyden, director and general manager of Pressed Steel Company, Limited, Paisley; Mr. C. S. McVey, sales manager of L. Sterne & Company, Limited, refrigerating machinery manufacturers, of Glasgow.

Mr. R. W. Lamont, chairman of Watson, Laidlaw & Company, Limited, chemical plant manufacturers, of Glasgow; Mr. A. C. Smith, sales director G. & J. Weir, Limited, engineers and makers of pumps, compressors and distilling plant, of Glasgow; Mr. John S. Young, managing director of John S. Young & Company, Limited, chemical plant and machine tool manufacturers, of Glasgow, and Mr. D. S. Reid, of the Scottish Council, who will act as secretary.

New Production Records for Stewarts and Lloyds

In the first week of July, two new production records were set up at the Bilston (Staffs) iron and steel works of Stewarts and Lloyds, Limited. Output of iron from the Elisabeth blast furnace was 5,949 tons, compared with 5,602 tons in the week ended June 11, and 11,006 tons of ingot steel were produced at the open-hearth plant, compared with 10,035 tons in the week ended April 7.

Output of ingot steel from the company's open-hearth plant at Corby (Northants) the week before last was a record at 5,637 tons—129 tons more than the previous best.

Parliamentary

Call-up of Ex-apprentices

When MR. STEPHEN SWINGLER (Lab.) asked what reply had been made by his department to a letter from Newcast Foundries, Limited, Silverdale, Newcastle-under-Lyme, concerning the granting of deferment of call-up to ex-apprentices in the machine-tool and allied industries, the MINISTER OF LABOUR, Mr. Edward Heath, said the firm had been told its employees did not qualify for deferment.

MR. SWINGLER said it was clear the Ministry had granted deferment to certain firms and not to others. Newcast Foundries was supplying certain parts to firms for making machine tools for exports, and the skill of all its men was vitally required to maintain production.

MR. HEATH replied that Newcast Foundries was a supplier for the machine-tool industry, but was not itself in the machine-tool industry. A firm requiring exemption had to be sponsored by another Government department showing that supplies would be affected because of limitations of suppliers if deferment were not granted. The firm mentioned had not been sponsored in this way, and he hoped it would no longer feel that it had been unfairly treated.

Symposium on Automatic Control

Members of the constituent societies of the British Conference on Automation and Computation will be aware that the first international congress of the International Federation of Automatic Control (IFAC) was held in Moscow from June 27 to July 7 this year. The congress was international and the British contribution consisted of 29 papers. Arrangements are now being made by the Institution of Mechanical Engineers for discussion of the British papers at a symposium in London, on September 27 and 28, for the benefit of those who are interested in this subject, but were not able to attend the Moscow congress. In addition to the discussion of the papers, it is planned to report briefly the more important contributions to the Moscow congress. Preprints of the British papers are available to those registered to attend the symposium. A list of the papers, together with a registration form to attend the symposium, may be obtained on application to the secretary of the Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, London, S.W.1.

Uses sought for Surplus Uranium

Mr. S. L. Gertsman, a leading metallurgist of the Canadian Government, who is chief of the Physical Metallurgy Division, Department of Mines and Technical Surveys, Ottawa, ended his visit to Sheffield last week. One of his missions was to approach Sheffield steel manufacturers in the hope of inducing them to develop a steel with a content of uranium. He said Canada was anxious to develop the non-nuclear uses of uranium; there was an over supply of the metal. He stressed that the use of uranium would not endanger the health of operatives. Mr. Gertsman went on: "We have been asked to investigate possible uses of uranium in steel, copper and other metals with a view to disposing of some of the over production. Experiments with steel have yielded some extremely interesting results. The addition of very small amounts of uranium improves the high-temperature properties of steel and its fatigue 'life,' and aids resistance to corrosion."

Company News

BEESTON BOILER COMPANY, LIMITED—Final dividend of 16 per cent. for the year ended March 31, 1960, makes 20 (17½) per cent. Net profit dropped from £150,768 to £132,460, after tax of £119,330 (£138,149).

DARTMOUTH MANUFACTURING COMPANY, LIMITED, ironfounders and boilermakers, etc.—Final dividend of 2d. per 1s. share makes 3d. for the year ended March 31, 1960, against nil for 1959 and 2d. for 1957-58.

LAFARGE ALUMINOUS CEMENT COMPANY, LIMITED—A final dividend of 1s. 6d. plus a bonus of 6d. makes 2s. 6d. per 5s. share (against 2s. 3d.) for the year to March 31, 1960. Net profit, after tax, is £166,022 (£119,944).

RUSTON & HORNSBY, LIMITED, engineers, steel and iron founders, of Lincoln—Group net profit for the year ended March 31, 1960, rose from £577,875 to £625,708, after tax of £361,227 (£403,070). The ordinary dividend is raised from 8 to 9 per cent., thus restoring the cut made a year ago.

TANGYES, LIMITED, makers of diesel engines, pumps, hydraulic machinery, etc., of Smethwick, Birmingham—The group net loss for 1959 was £28,019 (£73,201), increasing the debit forward to £73,620. During the first half of 1960 both orders and output were appreciably higher than last year.

ADAMANT & WESTERN ENGINEERING COMPANY, LIMITED, engineers, of Luton (Beds)—All the share capital of Charles S. Madan & Company, Limited, engineers and non-ferrous founders, of Altrincham (Ches), has been acquired for £165,000 cash and Adamant shares to the value of £56,000.

EDGAR ALLEN & COMPANY, LIMITED, steelmakers engineers, and founders, of Sheffield—Recent legislation will almost certainly occasion substantial additional capital expenditure within the next three or four years, states the chairman, Mr. W. H. Higginbotham. Group profit, after taxation, is £276,043 (£258,880).

GLOVER & MAIN, LIMITED—Referring to the purchase of all the issued capital of James Stott & Company, Limited, for £1,080,450, the chairman, Mr. P. D. Aird, said that it was a thriving concern and would fit well into the group. All the executive directors, including Mr. Vernon Stott, the managing director, would be continuing in the business.

HICK HARGREAVES & COMPANY, LIMITED, general engineers, ironfounders, etc., of Bolton (Lancs)—Final dividend of 14 per cent. is being paid, making 18 per cent. for the year to March 31, 1960, an increase of 2 per cent. on the previous year's total, which included a bonus of 4 per cent. Consolidated profit after tax of £367,169 (£335,929) and after deducting profits of a newly acquired subsidiary company is £397,903 (£329,305).

Teaching Centre in France

At Oyonnax, in France, a teaching centre, claimed to be the first in the world, has been opened to provide teaching facilities for the training of foundry technicians in the production of pressure- and gravity-die-castings. This establishment, which is in the south-east of France, was inaugurated in the presence of Mr. Maurice Olivier, Mr. Albert Brusson, Mr. Waeles, Mr. Guerin, Mr. Siegeot, and the new director of the *Centre Technique des Industries de la Fonderie*, Mr. Stupfler—which shows the importance the French foundry industry attaches to the development.

Sidney Gilchrist Thomas

World Pioneer of Steelmaking is honoured in his Native Land.

The illustrations alongside show the base portion of the obelisk (on which the inscriptions are just readable) and a second view of the complete monument against its sylvan background. The bas-relief head of Sidney Gilchrist Thomas which has been much admired, was modelled by Fred Mancini, sculptor of Wimbledon, and both that and the inscription plaques were cast in bronze at the Morris Singer art foundry, London, on instructions from the Newport monumental mason who was commissioned for the obelisk.

No longer is the world pioneer of basic steelmaking, Sidney Gilchrist Thomas, without honour in his native land, for, on Wednesday, July 6, a memorial to his name was unveiled by Mr. G. H. Latham, chairman of the Whitehead Iron & Steel Company, Limited, and president of the Newport and District Metallurgical Society. The ceremony was attended by a large gathering of people from the steel and allied industries.

The visible memorial has been erected on the site of the former Blaenavon Iron & Steel Company and takes the form of an obelisk in polished red granite bearing a life-like bronze head of Sidney Gilchrist Thomas in heavy relief and a bronze panel recording that successful experiments were carried out by him with the assistance of his cousin, Percy Carlisle Gilchrist.

In addition, there is to be established a Sidney Gilchrist Thomas Trust Fund, the income from which will be used firstly for the annual award of a cash prize to authors of any nationality for the best paper of the year relating to the developments in basic steelmaking published by the Iron and Steel Institute, the parent body of the Newport and District Metallurgical Society, and secondly for the award of travelling scholarships to suitably qualified candidates under the age of 30 to study developments in steelmaking practice in another country. A total approaching £6,000 has been contributed so far and a sum of D.M. 50,000 (approximately £4,300) has been promised on behalf of the German steel industry.

Biography of Achievement

Following the unveiling ceremony, Mr. Latham gave a succinct account of the achievements of this pioneer of the basic processes. Sidney Gilchrist Thomas, he said, was born in London in 1850, the son of William Thomas, a Welshman, and Millicent Thomas (*née* Gilchrist), a combination of the Welsh and Highland Celt. As a boy, he showed a strong desire towards applied science, but his father's death when he was only 17 prevented him from qualifying for a profession. He earned a living as a clerk in Thames Police Court, Stepney, in 1868 and remained there until 1879, *i.e.*, until his part-time experimental work at Blaenavon and elsewhere proved to be successful.

The young clerk began to study science privately and attended evening classes in much the same way as part-time students of today. During a course of lectures in metallurgy, the comment that "the man who eliminates phosphorus by means of the Bessemer converter will make his fortune" fired his imagination and afterwards this problem became the ruling passion of his life.

At the age of 25, Thomas, from his training in chemistry, concluded that dephosphorization of molten iron would only be possible by lining the converter with a basic material such as lime, magnesia, or dolomite to withstand additions of lime which had a strong affinity for oxide of phosphorus. Thomas concentrated the whole of his energies on finding a suitable lining for the converter and communicated this "basic" theory to his cousin, Percy Gilchrist, who was appointed chemist at the Blaenavon Steelworks in 1876. At first, Gilchrist was not very enthusiastic, but the persistence of Thomas prevailed and experimental tests suggested by Thomas were begun in 1877 with crucibles lined with limestone and lime, followed later with a small 6-lb. converter lined with limestone with sodium silicate as a binder. During this year Thomas

Sidney Gilchrist Thomas—Memorial Obelisk

arranged to be away occasionally from the police courts. So that he and Gilchrist could carry out tests each weekend, he often travelled to Blaenavon by the midnight train on Thursday night and returned on Sunday night.

Early in 1878 Mr. E. P. Martin, general manager of the Blaenavon Works, was admitted into the secret and he at once afforded facilities at the works on a larger scale, as well as at the Dowlais Works. A small fixed converter holding 3-4 cwt. of metal was erected at Blaenavon and some 50-60 "blows" were made. The next step was a series of tests in a 12-cwt. converter, and gradually the essential conditions for the removal of phosphorus from molten iron were determined. As a result, a paper was presented to the Iron and Steel Institute at the autumn meeting held in Paris in 1878 entitled "On the Elimination of Phosphorus in the Bessemer Converter", but its importance was not realized and the paper was not read and discussed until the following May meeting.

At the Paris meeting, however, Mr. Windsor Richards, general manager of Bolckow, Vaughan & Company, Limited, Middlesbrough, met Thomas and was so impressed with the importance of the results that he and Dr. Stead, the consulting Metallurgist to his company, arranged to visit Blaenavon in October, 1878, to see some experimental "blows", and as a result a series of large-scale tests was arranged to be carried out at the works in Middlesbrough in 30-cwt. converters early in 1879. Success was attained with a durable lining made from shrunk dolomite and tar and low-phosphorus steel was made by means of the "after blow."

Industrial Reality

The manufacture of steel from phosphoric iron thus became an industrial reality and soon steel manufacturers from the Continent negotiated with Thomas for the patent rights for these countries. France, Germany, Austria, Belgium, and Luxembourg soon adopted the "Thomas" process as their available ores were particularly suitable. The basic open-hearth process was soon developed, as Thomas rightly regarded the use of basic linings as of general application and today the vast majority of steel in all countries is made by the basic process. Thomas recognized the importance of "basic slag" as a fertilizer and concentrated on its application in agriculture up to the time of his early death in 1885 before he was 35 years of age.

Pointing out that world production of basic steel today was in excess of 300,000,000 tons per annum, Mr. Latham said it was a sobering thought that with the high-capacity modern furnaces of today the chemistry of steel manufacture remained much the same as in the days of the invention of the basic process. Basic linings and lime additions in open-hearth furnaces up to 500 tons, basic-Bessemer or "Thomas" converters of 50 tons, and oxygen top-blown LD converters of 100 tons (which would be installed at the Spencer Works, Llanwern) were still essential features of these processes as in the small converters used by Thomas.

Thomas's reputation on the Continent was extremely high and was scarcely less so in the United States. A visit there in 1881 could only be described as a triumphant tour. He was received with open arms and entertained by the most important people in the American iron and steel world and, incidentally, negotiated the American process rights. Andrew Carnegie said of Thomas: "He had only to appear and we bowed before his power. I have never met a man who carried me so completely away as did Sidney Thomas and we felt that we had one of the great men of our generation as our guest."

Blaenavon Site

In conclusion, Mr. Latham thanked Mr. R. Steel, of Daniel Doncaster & Sons, Limited, for having provided the site for the memorial and Mr. Newton Davis, of H. Davis & Sons (Sculptures), Limited, for the execution of the design and the erection of the memorial in collaboration with Mr. R. Payne, the architect. He announced that the head of Sidney Gilchrist Thomas had been modelled by the eminent sculptor, Mr. Fred Mancini, and cast at the Morris Singer Foundry in London.

Others who spoke at the ceremony were Mr. W. F. Cartwright, president of the Iron and Steel Institute, and Mr. R. Steel. Mr. Cartwright alluded to the recent modernization and future plans of the steel industry of this country and expressed the wish that something of the spirit of Sidney Gilchrist Thomas would be evident in the years to come. Mr. Steel said his company regarded it as an honour to have the memorial sited at its works. He invited all who were present to visit the two modern works now standing on the site, namely, the plant of Daniel Doncaster & Sons, which specializes in forging highly-alloyed steels and nickel-base alloys and the plant of Pickford, Holland & Company, Limited, for making magnesite and chrome-magnesite bricks.

Present at the Ceremony:

Among the many others who were present at the unveiling ceremony were:

Mr. W. Barr, a director of Colvilles, Limited, and a past president of the Iron and Steel Institute; Mr. K. Headlam-Morley, secretary of the Iron and Steel Institute; Mr. H. F. Spencer, managing director of Richard Thomas & Baldwins, Limited; Sir Andrew McCance, chairman of Colvilles, Limited; Sir Julian Pode, managing director of the Steel Company of Wales, Limited; Mr. R. T. Doncaster, managing director of Daniel Doncaster & Sons, Limited; Mr. J. Marcer, managing director of Pickford, Holland & Company, Limited; Mr. Arthur Thompson, chairman of Monmouthshire County Council; Mr. D. W. Puddle, chairman of Blaenavon Council, and Mr. T. G. Grey-Davies (hon. secretary), Mr. H. H. Stanley (chairman), Mr. T. Studley (hon. treasurer), and other officers of the Newport and District Metallurgical Society.

"Fuel and Power" Changes

New Council for Research and Development

A decision to wind-up the Fuel Efficiency Advisory Committee and to reconstitute the Scientific Advisory Council has been announced by Mr. Richard Wood, Minister of Power. The Scientific Advisory Council will be known as the Advisory Council on Research and Development and it will take over the functions of the Fuel Efficiency Advisory Committee. The council's terms of reference have been amended so as to emphasize that its advisory functions cover all aspects of research and development concerned with fuel and power from the laboratory to industrial application.

The council will advise the Minister on research and development in relation to his statutory duty of securing the effective and co-ordinated development of coal, petroleum, and other sources of fuel and power in Britain, and of promoting economy and efficiency in the supply, distribution, use, and consumption of fuel and power, whether produced in Britain or not.

It will also advise the Minister of new scientific and technical knowledge or applications of knowledge throughout the world, which in the opinion of the council should be taken into account in the performance of the Minister's statutory duties, and it will keep under continuous review the whole field of fuel and power with the object of identifying problems needing research and development and advising the Minister of these problems with a view to discussion with the industries concerned.

Members of the Council

With the winding-up of the Fuel Efficiency Advisory Committee, the council is being invited to appoint a standing committee on fuel technology. The council's first chairman is Sir Alexander Fleck, FRS, until recently chairman of Imperial Chemical Industries, Limited, chairman of the former advisory council and chairman of the Minister's Nuclear Safety Advisory Committee which was set up as recently as June 28. Sir Alexander is also well-known as chairman of the Coal Board Reorganization Committee of 1953-1955.

The deputy chairman is Captain (E) W. Gregson, chairman of the Fuel Efficiency Advisory Committee, and a director of Spencer-Bonecourt-Clarkson, Limited, W.G.I., Limited, and West's Piling & Construction Company, Limited.

Other members of the council include Lt.-Col. S. J. M. Auld, a director of the Manganese Bronze & Brass Company, Limited, Oil Operated Gears, Limited, and other companies, as oil industry consultant; Dr. C. M. Cawley, chief scientist, Ministry of Power; Mr. T. B. Clark, Imperial Chemical Industries; Sir Josiah Eccles, deputy chairman of the Electricity Council; Mr. W. K. Hutchison, deputy chairman of the Gas Council; Dr. W. A. Macfarlane, managing director of the National Industrial Fuel Efficiency Service; Sir Harry Melville, secretary of the Department of Scientific and Industrial Research; Mr. L. Rotherham, member for research, Central Electricity Generating Board; Prof. M. W. Thring, Professor of Fuel Technology and Chemical Engineering, Sheffield University; Dr. F. A. Vick, deputy director, Atomic Energy Research Establishment, Harwell; and Mr. A. H. A. Wynn, scientific member, National Coal Board.

The assessors are Mr. P. Chantler, economic adviser, Ministry of Power; Dr. E. Lee, director of stations and industry divisions, DSIR, and Mr. H. T. Ramsey, director of the Safety in Mines Research Establishment, Ministry of Power.

European Mechanical Handling Federation

The eighth annual congress of the *Fédération Européenne de la Manutention* (European Mechanical Handling Federation) was held in Stockholm from June 27 to July 2 and was attended by about 300 delegates.

The Association of Crane Makers was represented by eleven member-firms who attended meetings of section I (lifting appliances) and section V (mobile cranes). The technical sub-committee of section I has now completed a draft European standard specification for cranes which will shortly be distributed for comment, before final publication. An illustrated "terminology" in six languages, of the descriptions used in each country for various structural and mechanical components of cranes has been prepared. Copies will be available shortly from either the Association of Crane Makers (at 52, Lincoln's Inn Fields, London, W.C.2) or from the *Fédération's* headquarters at 10, Avenue Hoche, Paris VIII.

Future Work

Future work of the technical sub-committee will be to analyse all safety laws and regulations existing in various countries with the object of compiling a document setting out the compulsory safety regulations common to every country and also those peculiar to individual countries. It is also proposed to plan a programme of statistical testing of cranes to find out how often various types of cranes lift their maximum load and for what periods the cranes are actually running. (Mr. R. Pradon, of France, was re-elected chairman of section I).

The main activity of section V has been the work of the technical sub-committee in drafting a European standard specification for mobile cranes. Except for one or two clauses, this is now complete and will shortly be sent to all member countries for comment prior to publication. The section's illustrated terminology in six languages will be ready for printing within a few weeks. (Mr. A. Hallsworth of Steels Engineering Products, Limited, was unanimously re-elected chairman of this section.)

"Battle of the Bulge"

Industry's problem in dealing with the additional number of school leavers when the birth-rate bulge comes along in 1961-2 is considered in *Watch*, the parish paper of Attercliffe, Sheffield. It says that six places will then be needed for training in industry for every four before. "Will management and unions be flexible enough to meet this exceptional and important need?" it asks, and goes on, "Sheffield is particularly fortunate in the high proportion of boys who are normally admitted to apprenticeships. Last year there was not a seriously large number of boys and girls who could not get the skilled jobs they wanted and which they were recommended for, though some had to wait a few weeks." *Watch* says two conditions to provide the places in 1961-2 will be needed —industry will have to allow its intake to expand (with added expenditure), and the unions will need to increase the limits set on this intake. The difficulties are that the bulge is not normal and that mechanization and automation need a higher proportion of skilled workers.

BARROW HAEMATITE STEEL COMPANY, LIMITED—Mr. J. K. Howarth, secretary and a director, has been appointed assistant managing director. He will continue as secretary.

American Letter

Hoyt Memorial Lecture*

The 1960 American Foundrymen's Society's annual Charles Edgar Hoyt Memorial Lecture in Philadelphia was given by Mr. W. Grede, chairman of the board of Grede Foundries, Milwaukee, Wisconsin. During his lecture, he viewed with alarm that over the last ten years, population in the US had risen 20 per cent., yet iron and steel castings shipments had remained practically constant. He noted that "captive" tonnage had increased while the jobbing foundries share had fallen, perhaps because of the loss of 965 grey-iron shops (in America) in this period. This did not apply to light metals, he stated. Aluminium castings were up 58 per cent. and magnesium had jumped 258 per cent. over the last ten years, whilst copper had dropped 19 per cent. Despite gains in the light castings, the total volume of castings production (adjusted for variation in specific gravity) had risen only 3 per cent. overall. Looking at the country's competitors, Mr. Grede noted that ingot-steel production rose 30 per cent. in the same period, primary aluminium increased 205 per cent., wrought aluminium 95 per cent. and wrought magnesium 280 per cent.,—even plastics had increased 214 per cent. Mr. Grede stated that every foundryman faced the challenge of improved techniques of production, metal and design to recapture the market. He mentioned how well the aluminium, steel and even the cement manufacturers were broadcasting the merits of their products to engineers and designers, and believed that the foundry industry neglected such promotional efforts and he pleaded for enlarged activities by means of a concerted drive, both individually as well as through the respective trade associations. Generally speaking, Mr. Grede thought that foundries had, in the past, spent most of their time and efforts on making good castings and too little thought and effort had been devoted to telling the customers about new developments. Finally, he urged foundry sales engineers to know the foundry process and advantages to develop the maximum use of castings.

Cast Iron: New Tentative American Standard

For many years, (American) Standard Specifications for grey-iron castings (A 48 to 56) included both the tension test and the transverse test for qualifying castings in accordance with the specifications. The 1960 revision of specifications A 48 eliminates the description of the transverse test which is now covered in the new "Tentative Method for Transverse Testing of Grey Cast Iron" (A 438 to 60T). Provision still remains in specifications A 48 for the transverse test to be used as an optional method of qualification by agreement between the manufacturer and purchaser. When a transverse test is specifically authorized as a basis for acceptance, minimum test-values shall be established by agreement between the manufacturer and purchaser, and the test will be conducted according to the new method A 438.

*Extracted from *Gray Iron News*.

DEVELOPING QUANTITIES of new materials for use in the making of semi-conductor devices for the electronics and electrical industries are available from Monsanto Chemicals, Limited, it is announced. They are monocrystalline and polycrystalline gallium arsenide, polycrystalline indium arsenide and polycrystalline indium phosphide. All are made by Monsanto Chemicals, of the US, which controls the UK company.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1752 NEW-OPTICAL METHOD FOR THE DETERMINATION OF NON-METALLIC INCLUSIONS IN STEEL. Ernst, T., and G. König. *V. D. Emaillfachleute Mitt.*, 1959, Dec., pp. 93-96. (£3.) It is shown that the refractive index of transparent substances can be determined on a good reflecting surface, analogous to the methods by Becke and Schröder van der Kolk, only using a microscope with reflected light. A method is described by the aid of which the refractive index, the true colour and approximate size of transparent non-metallic steel inclusions can be determined. The surface of the steel sample is electrolytically removed and the protruding undissolved non-metallic inclusions are embedded in an immersion liquid and examined under a metallographic microscope.

1783 RESEARCH INTO THE INFLUENCE OF ADDITION ELEMENTS IN AUSTENITIC STEELS ON THE LIMIT OF ELASTICITY AT ROOM TEMPERATURE. Nohl, H., *et al. Mem. Scientifiques Rev. Met.*, 1959 (1), pp. 22-29. (£4.)

New translations in course of preparation include:—

1766 EFFECT OF THE LOADING TIME ON THE HARDNESS OF METALS AND ALLOYS. Shishokin, V. P. *Zhur. Tekhn. Fiziki*, 1938 (18), pp. 1613-1628. (*Metallurgical Abstract*, 1940, p. 504.) (Included in response to requests—Form C 88.)

1776 INCREASED ECONOMY BY USE OF PRECISION CASTINGS. Nickel, E. G. *Industrie Anzeiger*, 1960, May 10.

1777 NEW FINDINGS OBTAINED IN BLOWING PURE OXYGEN ON TO THE SURFACE OF THE BATH OF HIGH-PHOSPHORUS PIG-IRON. Speith, K. G., *et al. Stahl u. Eisen*, 1960, May 26, pp. 733-736.

1785 WATER SUPPLY SYSTEM IN AN IRON AND STEEL WORKS. Knecht, E. *Stahl u. Eisen*, 1960, May 26, pp. 751-756.

1788 PRELIMINARY TESTS OF LUMP-SIZE ORES WITH A VIEW TO THEIR BEHAVIOUR IN THE BLAST-FURNACE. Birnbaum, H., *et al. Stahl u. Eisen*, 1960, June 9, pp. 781-788.

1790 CONTRIBUTION TO THE INVESTIGATION OF PRESSURE LOSSES IN PNEUMATIC-HANDLING SYSTEMS. Hahnemann, H. W. *V.D.I.Z.* 1960, February 1, pp. 131-132.

The following translations are in course of preparation by Mr. H. Brutcher, to whom enquiries should be addressed at Technical Translations, P.O. Box 157, Altadena, Calif., U.S.A.:

HB 4822 INTERACTION OF ELEMENTS AND THEIR OXIDES IN THE WELD POOL. Dobrokhotov. *Avtogen. Delo*, 1948 (9).

HB 4848 VACUUM TREATMENT OF STEELS IN LADLE. Speith, K. G., *et al. Stahl u. Eisen*, 1960 (14), pp. 737-743.

HB 4854 EFFECT OF LOW TEMPERATURES UPON FRACTURE-TYPE AND TOUGHNESS OF STEEL. Braun, M. P. *Izvest. Akad. Nauk S.S.S.R., OTN, Met. i Topl.*, 1960 (2), 104-9.

For the translations listed below, enquiries for those bearing the reference letters BCIRA should be addressed to the British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham; translations with the M.T. reference are obtainable from Mr. M. de O. Tollemache, The Old Rectory, Lewknor, Oxon.

RECOVERY OF UNBURNT GASES (FROM OXYGEN-BLOWN CONVERTERS). Allard, M., and G. Namy. *Rev. Met.*, 1960, March, pp. 207-220. Trans. in *Iron and Coal Trades Review*, 1960, May 20, pp. 1125-1135, 1140.

BCIRA 948 METHODS OF RAISING THE TEMPERATURE OF MOLTEN IRON IN THE CUPOLA. Garkusha, I. T. *Lit. Proizv.*, 1957, No. 2, February, pp. 18-20.

M.T. 104 NATURE OF THE PRECIPITATES FORMED FROM MODIFIED 12 PER CENT. CHROMIUM STEEL IN THE TEMPERATURE RANGE ABOVE 500 DEG. C. Jezek, J., J. Koutsky, and J. Pluhar. *Hutnicke Listy*, 1959, XIV, No. 5, pp. 469-472.

M.T. 103 STRUCTURAL STABILITY OF 12 PER CENT. CR-W-MO-V STEELS. Koutsky, J., J. Neid, and J. Jezek. *Hutnicke Listy*, 1958, XIII, No. 3, pp. 199-205.

BCIRA 952 COOLING CURVES FOR CAST IRON. Malinochka, Ya. N., and Yu. N. Taran. *Lit. Proizv.*, 1957, No. 8, Aug., p. 32.

SOME ASPECTS OF ULTRASONIC TESTING OF CRANKSHAFTS. Panseri, C., and M. Robba. *Rivista di Ingegneria*, 1960, vol. 10 (3), March, pp. 257-280. Abridged trans. in *Engineers' Digest*, 1960, vol. 21 (5), May, pp. 96-7.

IBF Fifty-seventh Annual Conference

Continuing the Account of the General Proceedings and Technical Sessions at Malvern, June 21 to 24*

This section of the report of the Institute of British Foundrymen's annual conference held at Malvern last month begins with an extract of the presidential address given by Mr. G. R. Shotton, continues with notes on the remaining social functions and ladies' programme, and concludes with summaries of the papers presented and some of the discussions which followed.

During the proceedings of the Annual Conference of the Institute of British Foundrymen at Malvern last month, the annual general meeting on the Wednesday morning was followed—after a break for coffee—by the Address read by the new president, Mr. G. R. Shotton, F.I.M. (Mr. C. H. Wilson the immediate past-president continued to occupy the chair for the remainder of the morning's session). Mr. Shotton took for his subject " The Status and Training of Future Foundrymen."

PRESIDENTIAL ADDRESS

Some of the more outstanding statements of the Address, which was a model of forward thinking on the subject, include:

" Foundrymen are all too often regarded as a lot of misguided but enthusiastic individuals who have chosen a queer way to earn a living, and who don't appear to know much about what they are doing, as evidenced by the comparative frequency with which they allow a job to go wrong.

" Engineers have little understanding for the heartbreaks of operating a furnace which suddenly becomes fickle in its behaviour; of a sand system which apparently produces material corresponding to specification but which unexpectedly scabs, washes, blows, or refuses to ram properly; of the feeders which produce a sound casting for months but suddenly fail to do so; of the batch of cores which unexpectedly sag and deform, and thus show errors when castings are machined.

Necessary Anticipation

" How does one educate customers to appreciate these problems? " Mr. Shotton continued. " We often condemn ourselves by our own apologetic attitude and our ready acceptance that in producing a bad batch, we are guilty of failing to exercise proper control over production variables—variables which we can and do analyze in retrospect.

" Herein lies the whole art of founding—the constant need to anticipate the possible effect of variables which constitute potential dangers, and the establishment of methods which by experience or trial can be expected to accommodate the range of variables presumed to exist in any prescribed system of production.

" It is the quality of intelligent anticipation which marks the successful foundryman, and it must be developed to the point where it almost becomes an instinct—an instinct which fuctions spontaneously and not necessarily in the direct knowledge that particular conditions actually are already existing. Yet this ' instinct ' is not born in prospective foundrymen, it is the product of an agile mind which has been soundly educated on underlying principles and garnished with practical ex-

* An account of the early sessions and social events of the conference appeared in the July 7 issue of the JOURNAL.

Group photographed at the Civic Reception by Malvern UDC on the Tuesday of Conference week. From l. to r. Mr. H. Stevens (Australia), Mrs. Adams, Mr. H. F. Lewis, J. P. (chairman, Malvern UDC), Mrs. Lewis, Mr. G. P. Adams (president, IBF Australia (Victoria) branch), Mrs. Wilson, and Mr. C. H. Wilson (retiring president).

Mr. G. J. Shaw, B.Sc., delivering the third report of sub-committee T.S. 43 of the IBF Technical Council on "Cupola Developments" at the first of the Conference technical sessions, with Mr. G. R. Shotton in the chair.

perience on the 'hows' and 'whys' of foundry hazards.

"The foundry industry is today producing, cheaply and in large quantities, castings of an intricacy which 20 or 30 years ago could only have been made slowly and laboriously by highly-skilled craftsmen. The very methods which enable this to be done in themselves create hazards and difficulties which call for more and more intensive control in everyday production."

What is a "Foundryman"?

In his attempt to define his conception of a "Foundryman" Mr. Shotton said:—"I have already referred several times to 'foundrymen' and I use this term in the same sense that 'engineer' is used in professional circles. The theme of this address does no more concern itself with craft operations such as moulding, coremaking, and patternmaking, than does the name 'engineer' imply a turner, miller or capstan operator.

"Our industry is already beginning to realize that while many men trained over the last decade or two are expert and valuable in certain spheres, many of them are incapable of using their knowledge effectively in an entirely new environment. This I suggest is because many training schemes have become specialized from the very moment a new entrant starts work in the industry. A serious effort should be made to obtain the best compromise between the versatile knowledge of the older generation and the more highly technical and specialized expertize of the present generation. These requirements impose an urgency on the training for the next generation of foundrymen . . . who cannot really be effective . . . if such specialized knowledge is not soundly based on a broad appreciation of the whole subject."

Specialization Premature

Making a plea against premature specialization in training, the president said: "Surely the answer is to strike a proper balance in training. Young student foundrymen should be given the widest possible training and experience in all aspects of foundry technique during their apprenticeship and for a few years afterwards. There is no substitute for first-hand knowledge gained in actual practice, particularly if it is allied with a sound education in technical principles.

"Even more important, the new type of foundrymen will be more easily capable of moving from one specialized branch of foundry practice to some other, which might call for both the development of different techniques and also the mental flexibility to develop the expert application of knowledge already available in that field."

The Institute's Rôle

Enlarging further on this point, Mr. Shotton next asked how this objective could be achieved and went on to say "The Institute can seek to formulate schemes of training and education on the broadest possible basis. In this, they can give valuable guidance to other bodies like the Council of Ironfoundry Associations who are also doing valuable work in this field. The objective could also be achieved," Mr. Shotton continued "by establishing a professional standard by which the phrase 'qualified foundryman' could become synonymous with 'qualified engineer'. This would probably demand the establishment of an examination qualification in foundrywork, either in the form of a Higher National Certificate or Higher National Diploma, or perhaps even as an examination qualification for at least one grade of membership of the Institute." Third and fourth in his *modus operandi* Mr. Shotton quoted co-operation with other educational bodies, such as the National Foundry College and continuance of IBF activities—technical meetings, Technical Council work, Foremen's courses and similar."

Mr. Shotton then continued later by stressing the importance of building up a versatile attitude of mind by plunging young foundrymen into both technical and management problems under conditions which would force them personally to analyse the problem and to use their own initiative in solving it. "Diversification" he said, "in the post-apprenticeship period would produce something more than mere competence. It would develop a questioning mind, confident of its own ability to break down new problems and apply logical reasoning based on a sound technical appreciation, allied with an eager enthusiasm to become involved in new activities and to acquire new knowledge".

Recruitment and Status

Concluding his presidential address, Mr. Shotton said that recruitment of sufficient new entrants of

proper calibre would ultimately depend on raising the status of foundrymen by developing a wider appreciation in engineering circles of the technical qualities of foundry practice. "We must stop being apologetic about our industry," he said, "and particularly about our future and instead we must seek to spread better understanding of our difficulties while still imparting confidence in our technical ability to overcome any particular production problem".

He summed up by saying that he was not pessimistic on the question of status and knew that there had been considerable progress in this matter, but more remained to be achieved in this direction. Mr. Shotton's closing remarks were: "The next few generations of foundrymen *must* advance well beyond our present frontiers of knowledge and will, I hope, achieve for the industry a fuller recognition of its technical skills and of its vital importance to British industry".

GENERAL PROCEEDINGS

For most of the menfolk attending the Conference, the whole daytime of Thursday was occupied with works visits, all of which involved travelling by coach in the morning to either the Coventry or Birmingham and West Midlands areas and returning to Malvern in the evening. These trips involved a round journey of anything up to 80 miles and thus early starts were made. The firms offering hospitality on this occasion were British Piston Ring Company, Limited (morning), Humber, Limited (afternoon); Sterling Metals, Limited (all-day visit); Charles Carr, Limited (morning), John Harper & Company, Limited (afternoon); F. H. Lloyd & Company, Limited (all-day visit); W. & T. Avery, Limited (morning); Shotton Bros., Limited (afternoon); Dartmouth Auto Castings, Limited, and Birmingham Aluminium Castings Company (1903), Limited (all-day visit). (As an alternative to participation in works visits, it was open for some of the men attending the Conference to accompany the ladies on a coach tour of the Wye Valley, occupying the whole day, and a few did in fact take advantage of this opportunity for relaxation from the business of the programme.)

The whole programme of works visits passed off remarkably well and generous hospitality was accorded the visitors by the various firms either on their own premises or at nearby hotels and restaurants. At a number of the works, also, interesting souvenirs, brochures and booklets were dispensed. It is an interesting sidelight on the excellence of the reception arrangements that despite the fact that at least two of the foundries were flooded—as the result of a torrential storm—only a very short time before the parties were due to arrive on Thursday morning, the damage and debris were cleared up and production had been recommended by the time the visitors turned up.

Useful Timesaver

At several of the works, time available was barely sufficient for seeing all of interest, even though some shops with only subsidiary connection with foundrywork were by-passed. Specially commendable at one of the works visited by the writer was the pre-planning which had been carried out to avoid waste of time. On arrival of the party at the works, each member was handed two cyclostyled lists; the first gave the names of all the visitors, the sub-group number under which they would tour the works, and the name of the guide. The guides, who were awaiting the party, each exhibited a placard carrying their group number and thus the visitors were able straightaway to "form fours" (or, maybe, it was sixes) under their respective "banner," and introduce themselves to the guide. The second "hand-out" detailed the composition of each sub-group; with its aid, each member was able to identify his fellows and the firms to which they were attached. The net result was that within three minutes of arrival at the works, all the groups could move off on their pre-determined paths of inspection. (This was in great contrast to some visits in which the writer has participated in which anything up to half an hour or even more has been spent in sub-division and marshalling of the tour groups.)

Although the evening was to be regarded as free of formal engagements, a number of the delegates

Part of the audience gathered in the Festival Theatre of the Winter Gardens, Malvern, to hear Mr. G. R. Shotton's presidential address on the Wednesday.

Friendly scenes at the IBF social functions in Malvern. (left) Mrs. Crook and Mr. A. J. Crook (Birmingham branch secretary) with Mr. D. Moir (past-president, Birmingham branch) with Mrs. Moir at the annual banquet, and (right) top-table groups, mainly of the president, past and future presidents and their wives at Friday's informal dinner.

booked to see the show "Pygmalion," in which Diana Churchill was appearing, at the Festival Theatre, Malvern. Later that evening, there was a "theatre club" at the Winter Gardens, Malvern, light music and refreshments being served.

Friday's Events

As stated earlier in this report, last year's precedent was followed—namely, Friday, which used to be reserved for the works visits was in fact devoted to the continuation of the technical sessions. This, it was stated, was because it was perhaps easier to secure early attendance at the study sessions after a free evening than it had been on Thursdays following the annual banquet. (Some of the proceedings, when the various papers were presented will be recorded later.)

Ladies' Programme

While the male members among the Conference gathering were busily engaged with technology on Friday, a separate programme had, as usual, been prepared for their ladies. This comprised alternative visits to Hereford and Ledbury (with side trips to places of interest) occupying the whole day or, alternatively, to the Worcester Royal Porcelain Company, Limited, at Worcester, which included a tour of the Cathedral.

Earlier, on the Thursday, in addition to the lengthy tour of the Wye Valley already referred to, there was alternatively available a visit to Stratford-upon-Avon (inspecting places historically associated with Shakespeare); to Broadway, near Evesham (including a visit to Gordon Russell, Limited, furniture manufacturers) or to the carpet factory of Brintons, Limited, at Kidderminster. In each case, the arrangements for the ladies' excursions included luncheon at a convenient place. All these functions were spoken well of by those who participated.

Closing Dinner

On Friday evening—also at the Winter Gardens, Malvern—members and ladies reassembled in festive mood for the closing dinner/dance and cabaret. Mr. G. R. Shotton, F.I.M., the new president, occupied the chair, surrounded by quite an array of past-presidents and future presidents and their ladies, together with representatives of Malvern UDC. The whole proceedings were informal, with no speeches except impromptu votes of thanks; there was music (supplied by the Harry Engelman Orchestra) and dancing during dinner and afterwards. At intervals before the proceedings closed at 1 a.m., a cabaret show was put on by Wallace, Delyse and Jeanette and Patricia Varley.

* * * * *

This function concluded a most enjoyable Conference, the following day (Saturday) being used by most of the members and ladies for travelling home for the rest of the weekend.

TECHNICAL SESSIONS

As stated earlier, the technical sessions of the IBF Conference at Malvern occupied the whole of Wednesday afternoon and all day on Friday. In general, there were two meetings taking place simultaneously—in the Festival Theatre and Priory Lodge Hall of the Winter Gardens. The chairmanship of the respective sessions was taken over at various times by the president, vice-presidents, past-presidents and other principal officers of the Institute. In each case, the lecturer presenting a paper or report occupied about 10 minutes in introducing his subject (much on the lines of the synopses given in what follows) and the remainder of the period was given over to discussion, the lecturer answering on the spot queries arising amongst his audience.

The sessions at which the writer was present were not-too-well attended, bearing in mind the

total number of registrations for the Conference, but it was obvious that members had shown considerable discrimination in moving from one session to another so that they were present when subjects which interested them were being raised. This movement was facilitated by the fact that the respective meeting-halls were only about 100 yards apart.

In some cases, discussions were brisk and to the point, in others they flagged somewhat, the chairmen having to use discretion in allowing extra time for a few—as usual it was the more-practical subjects which seemed to attract most widespread interest although there were some little *cliques* of "experts" who obviously would have been prepared to argue fine points of distinction on some occasions at great length—the chairman being willing to let them.

The following extracts from the 18 papers and reports presented are given in order of original listing and not necessarily in order of presentation:—

"Cupola Developments"- Third Report of Sub-committee T.S.43 of the Institute's Technical Council

Sub-committee T.S.43 was appointed by the Technical Council of the Institute in December, 1951, to consider aspects of cupola development with the following terms of reference: "To investigate the hot-blast system, carburization, desulphurization, water-cooling and combinations of these." During the past eight years, sub-committee T.S.43 has studied all these and other aspects of cupola developments. In the first report (presented at the 1954 conference at Glasgow), the whole position was examined and work carried out up to that date was reviewed. The second report (presented in 1957 at Harrogate) dealt exclusively with hot-blast cupola practice and oxygen enrichment.

In this third report (presented at Malvern by Dr. G. J. Shaw, B.SC., chairman of the sub-committee), the present position of hot-blast cupola practice was reported and a further comparison was made between hot- and cold-blast cupolas. At the request of the IBF Technical Council, special attention had been paid to water-cooled cupolas, in particular those of small diameter. During the past three years, questionnaires had been circulated to foundries using water-cooled cupolas and the information received had been examined and classified. From the results of these questionnaires, the sub-committee had drawn certain conclusions and had attempted to formulate recommendations which it was hoped would be of use to foundries contemplating the installation of water cooling on their cupolas. The problem of slag composition, its effect on metal analysis, and the possibility of developing rapid tests for determining metal composition by the visual examination of a slag sample had also been studied.

Observations on Water Cooling

The number of systems now in operation showed that there were no mechanical difficulties or danger in applying water-cooling. The main problem which arose was that of temperature loss of the metal melted, which had been experienced in some cases—particularly with small cupolas. In trying to sort out the information gained from the questionnaires, the sub-committee had found that the variety of water-cooling systems used and the differing requirements in output, temperature, and metallurgy of each individual foundry made the correlation of the information extremely difficult. For example, no operator of a water-cooled cupola could accurately assess his make-up water and thus no estimate could be made of the heat lost if some of the water were evaporated to steam. Such a loss on an externally-cooled installation could be considerable.

On the other hand, in the majority of cases where water-cooling had been applied, it had been sufficiently successful to be currently used. The instances known to the sub-committee where water cooling had been tried and discarded were related either to small cupolas or medium-size cupolas (where high tapping-temperatures were required), but these did not form a high proportion of the number of installations in this country. The sub-committee had directed much of its attention to the water-cooling of small cupolas and a broad generalization could be made that small water-cooled cupolas required more coke for a given tapping-temperature than medium and large ones. If the coke charge were related to the pig-iron content of the charge, the large cold-blast cupolas fell into line as regards the fuel consumption and tapping temperatures. Two operators of small water-cooled cupolas had found it essential to increase their tapping temperatures by oxygen enrichment.

Slag/Metal Reactions

The report of the sub-committee next dealt with slag/metal reactions and it was stated that there appeared to be very little relationship between colour and composition of acid slags, but with basic slags, there was a progressive lightening in colour as the basicity increased, although this was affected by the FeO and MnO contents. The report then dealt with metallurgical control by slag composition and results noted were that the general effect of sulphur was to reduce the solubility of carbon in molten iron, and this decrease was also related to the temperature. Thus, the presence of 1 per cent. sulphur reduced the solubility of carbon by 1.67 per cent. at 1,200 deg. C., and by 1.17 per cent. at 1,700 deg. C. This was much greater than the effect of silicon and phosphorus, 1 per cent. of either of these elements corresponding to between 0.3 and 0.4 per cent. of carbon.

The report continued by dealing with the reactions of sulphur, silicon and phosphorus, and concluded by stating that the rise in phosphorus —by cast-iron standards—was not of a high order,

but it should be noted that it could give rise to serious trouble if the cupola was being used in duplex steelmaking operations. A number of tables were included in the report of T.S.43 to cover the relationship between coke quantity and metal temperatures; comparison of hot-and cold-blast cupolas; metal temperature variations during melting and data summaries on water-cooled cupolas—to name just a few of their titles.

Uncooled Basic Cupola

By B. R. Douglas

The paper presented next in the same session described a 32-in. dia. cupola operated with a basic lining without hot blast or water-cooling. The cupola described is used to melt charges of up to 70 per cent. of steel and produces iron with sulphur contents of less than 0.020 per cent., suitable for the production of spheroidal-graphite iron. The Author, who is chief metallurgist with John Williams of Cardiff, Limited, dealt with the early experiments carried out by his company in the use of a basic cupola, its initial design, and the first melts, and went on to describe the modified design, and the current design of the cupola in present use.

In his conclusions, the Author stated that it was possible to convert a standard cupola to basic operation very cheaply. Such a cupola could be used—by careful control of the slag—to produce grey irons to BSS specifications or for treatment to produce spheroidal-graphite iron. The cost of increased melt control was more than counterbalanced by the possibility of using high percentages of steel scrap in the charge and the possibility of producing irons with sulphur contents as low as those given by an electric furnace.

"Effect of Vibration on the Stress-relief of Castings"- Third Report of Sub-committee T.S.32 of the IBF Technical Council

Mr. M. M. Hallett, M.SC., F.I.M., chairman of sub-committee T.S.32 presented this, the third report of the sub-committee, with Dr. D. V. Atterton, M.A., vice-chairman of the Technical Council in the chair. During the course of the report, it was stated that two series of tests on stress-relief of castings by vibration had been carried out. The first involved the application of simple methods of vibration to the grid casting which had been so designed as to carry residual stresses and which had been used in the earlier work of the sub-committee. The second series of tests involved the application of vibration to a test-piece loaded to a known stress, followed by measurement of the change in stress after vibration. No useful relief of stress, Mr. Hallett said, had been achieved by any of the treatments applied under any conditions, though there was an indication of a very small relief by vibration at high levels of internal stress.

Comment

In the closing section of the report, under the heading "Discussion," the sub-committee had made the following statements: "The sub-committee believes that the relief of internal stress in practice must result from plastic deformation. The easiest method of promoting this was by raising the temperature of the casting to a degree which would allow the metal to creep sufficiently under the internal stresses present. It was known that repeated loading, under fatigue conditions, could bring about a re-distribution of stress and it might have been thought that grey cast iron would be more amenable to stress-relief by vibration because of its lack of homogeneity. Under relatively small average applied stresses, points of stress-concentration, such as at the ends of the graphite flakes, could show considerably higher local stresses leading to local plastic deformation and such local deformation might integrate to a general change in the internal-stress system."

Nevertheless, the sub-committee stated that both series of experiments suggested that simple vibrational treatments applied under any normal foundry conditions were not effective in giving rise to any worthwhile relief of stress. It was significant that the slight degree of stress-relief noted at relatively high levels of applied stress had been practically the same both in steel and cast iron. The sub-committee therefore concluded that stress-relief by vibration of the types described in the report could not immediately be recommended for application in the foundry industry.

Discussion

Opening the discussion, Mr. E. Longden gave quite a lengthy contribution to the subject, stressing the inter-relation between this work and earlier reports and papers presented to the Institute. This was followed by a member of the audience stating that people who asked for high-duty irons where these were not really required, might be buying higher-stressed castings. Another contributor asked whether machining vibration could relieve stresses and he was told that machining *per se* had little effect: it was best to stress-relieve by heat-treatment before rough machining was carried out and then again before final machining.

"Cast Aluminium-alloy Crankcases for the Deltic Engine"

By R. W. Eade and K. Evans

Mr. J. Blakiston occupied the chair for the session when this paper on large aluminium crankcase castings was presented. The Authors are, respectively, technical director and superintendent (aluminium foundries) with J. Stone & Company (Charlton), Limited. Mr. Evans presented the paper at Malvern and said that diesel engines of the Deltic design had been built, using the crankcases

referred to which were cast in aluminium alloy, BS 1490, LM 8. The largest of these complex castings weighed 565 lb.; they were made from moulds formed from "core" assemblies—apart from a greensand cope which formed the top face of the casting and carried the feeder heads. The cores were located in a machined cast-iron plate because of the strict dimensional control which was vital, not merely for reasons of proper stress distribution, but because the weight of the castings had to be controlled to within 2½ per cent., to enable that of the finished engine also to be closely controlled. The use of core-assembly templates during mould preparation was outlined and details were given of the sands used for coremaking, the core-assembly method itself, running method, and the use of exothermic materials around the feeder-heads—in the interest of soundness of casting and economy. The control of metal melting and the inspection and quality-control procedures used for these complex, high-performance castings were also dealt with.

In presenting their report, the Authors dealt first with the production techniques used for the manufacture of the crankcases used in the Deltic engine and went on to describe the pattern and corebox equipment used. All the coreboxes had been constructed from specially-selected mahogany, with cast aluminium-alloy inserts on all surfaces liable to damage. Each corebox was faced with brass strip ⅛-in. thick on the working face. (As the general wall-thickness of the casting was only 0.3125 in., very little distortion could result in quite a high increase in the total weight of the casting.) Routine checking of the pattern equipment was therefore most important and, in addition, a routine check had to be kept on the fettled weight of each casting.

Mould and Core Material

Owing to the different conditions in various parts of the mould, a number of different core materials were used. The large side cores were made with sodium-silicate bonded sand (five pints of sodium-silicate binder to 400 lb. of silica sand). The long oil-gallery core presented a particularly difficult problem. A normal oil-sand mix gave far too high a rate of gas evolution, and the best results to date had been achieved using a Swedish wood-resin corebinder, which had a very low gas-content and a low rate of gas evolution, combined with excellent breakdown properties. These cores needed to be dried very slowly (overnight, at 200 deg. C.), the cores being bedded out in natural sand for drying. In another part, the core sand used for the bay cores needed to have highest possible breakdown properties and a urea-formaldehyde resin-bond was therefore chosen for this item. The finger cores were produced in halves in the urea mix and fastened together with a core adhesive. All cores were treated with a mould coat to give an even surface and to mask all core joints.

The paper then described the running techniques employed, pouring, fettling, inspection and quality control.

Discussion

The first questions addressed to the Authors when the meeting was opened for discussion asked them why they had preferred to use a long oil-gallery core instead of a pipe insert and why crucibles had been used for de-gassing the metal. To these, Mr. Evans's reply was to the effect that the method for making the Deltic crankcase had been built up as a result of experience and it was not claimed that "the millennium" had yet been reached. In actual fact, the melts had been prepared in quite large (450-lb.) crucibles, so that de-gassing procedure was not so unusual as perhaps it had sounded. A risk with large exothermic sleeves was stated to be the danger of "gassy" metal being drawn into the casting—a danger not so likely with small heads in greater number. Enlarging on "melting" in response to a further question, Mr. Evans said that first silicon-carbide and now ordinary plumbago crucibles were being used; they had never used iron ones for this purpose. Further questions at this session requested information on core location; what was meant by average tolerances; causes of scrap, and methods of heat-treatment. The replies to most of these were related to dimensional accuracy, *i.e.*, the relative tolerances between different jigging and machining points on the castings. In conclusion, the Authors confirmed that causes of the scrap were mainly dimensional, arising from such mishaps as core sagging.

Close-tolerance Castings in Aluminium Alloy

By J. C. Bailey, B.Sc., F.I.M.

The paper stated that certain engineering components that could be made by casting were often required to a dimensional accuracy not possible by traditional processes—such as ordinary sand, gravity or even pressure-die-casting. Various processes had been developed for making close-tolerance castings and to achieve such advantages as the reduction of machining allowances—perhaps, the entire elimination of the machining process—or the achievement of dimensional accuracy on internal bores where a casting could not be machined. The Author summarized the requirements and characteristics of close-tolerance aluminium-alloy castings made by four processes that have become established in the last few years—shell-moulding, the plaster process, the Shaw process, and the Mercast process. Factors influencing dimensional accuracy such as the size of the casting, its complexity, contraction allowance, and the accuracy of the pattern equipment were considered, and the methods, pattern materials, and mould materials used by the founder were described. The need for close consultation between the designer and the founder at the design stage was strongly emphasized. Examples were given of castings such as automatic-transmission casings, impellers, tyre-moulds, and wave-guides.

In the body of the paper, the Author first put

forward the case for close-tolerance castings and listed the many factors which affected the degree of accuracy. He then dealt, in turn, with the various high-accuracy processes used in light-alloy foundries mentioned earlier.

Conclusions

In his conclusions, Mr. Bailey stated that a great advance had been made in the accuracy and finish of castings made on a routine-production basis for precise engineering requirements and he foresaw that it was possible that even more stringent demands would be made in the future, particularly in the development of the complex instruments now required for many new purposes, *e.g.*, in the fields of radar, electronic control, automation, high-speed rotary equipment and automatic gearboxes. Space-travel, he said, would demand the development of entirely new instruments and because these would, in most cases, have to be as light as possible for projection into space, the choice of material frequently would fall on aluminium alloys. The method of producing a complex shape was most likely to be by casting rather than by fabrication or other means, and in this respect the Author felt that casting processes were, in fact, unrivalled.

Finally, the paper stated that it might well be that the practical limit was being approached as regards improvement in casting accuracy which could arise from the development of new casting techniques alone; already the degree of accuracy attainable was restricted in certain cases by dimensional changes that subsequently occurred in the casting as a result of purely metallurgical phenomena, irrespective of the casting process as such. Alloy development and the refinement of heat-treatments applied to promote dimensional stability in the casting might therefore require fresh attention in the future.

Discussion

For the presentation of this paper, the senior vice-president, Mr. D. A. Richards, had taken the chair, and after the Author, who is assistant technical director of the Aluminium Development Association, had given a summary of the possibilities of the various processes outlined in his paper, (much on the lines recorded earlier) the meeting was opened for discussion.

First among the comments was a contribution relating first-hand experience gained in South Africa of applications of the Shaw process to producing highly-accurate castings. Another speaker asked if perhaps new processes were being concentrated on to the neglect of older ones; the Author admitted this possibility, but said it was up to foundrymen to seize on what they needed and adapt to their own production. Another speaker asked why all the alloys quoted had not been given their BS. 1490 LM reference numbers. Here, again, the Author said the alloys were as quoted by makers of casting examples he had used and he had not felt justified in altering them.

Replying to a query on dimensional tolerance across the joint when shell moulding, his opinion was that this could be almost the same as within a shell half. Thereupon, an Australian visitor—explaining that he himself operated a "shell only" foundry—said that with careful attention he could produce castings to a tolerance of $\pm$ 0·005 in. across the joint of two shell-halves. Other contributions to this discussion included mention of the Osbrink process, other investment-casting processes in addition to the Mercast method described by the Author, and remarks on the use of foamed polystyrene plastic patterns. On the latter subject, information seemed to be quite meagre, but it was explained that additional data was due to be published shortly.

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The papers dealt with in the preceding pages comprise nearly all those presented and discussed at the Wednesday technical sessions. A further report on the papers presented during the remainder of Wednesday and the whole of Friday in IBF conference week will be printed shortly—EDITOR.

Awards for Newton, Chambers' Apprentices

Awards to encourage research and technical aducation in the gas industry are made each year by the Gas Plant Manufacturers' Development Council and nine of them have gone this year to apprentices from Newton, Chambers & Company, Limited, ironfounders, engineers, and chemical manufacturers, of Thorncliffe, near Sheffield. Presenting the awards recently, Mr. S. B. Rippon, general sales manager of the engineering division of the company and a member of the council, said that the company, one of the leading manufacturers of gasworks plant in the country, had been associated with the industry for 150 years. It was also a member of the council which is responsible for the awards, and grants and scholarships to universities every year.

Awards went to the following:—W. Gash, H. J. Godber, T. Tonks, F. Dean, R. Grantham, B. Walton, K. Taylor, R. Littledyke, and S. Ramage.

New Chairman of CFA Training Committee

Mr. R. A. S. Lomax, works director of Ashwell & Nesbit, Limited, Leicester, has accepted the invitation of the Council of Ironfoundry Associations to become chairman of its Recruitment, Education and Training Committee. Mr. Lomax is a former president of the North Midlands branch, and now senior vice-president of the Ironfounders National Confederation, and has been keenly interested in training for a number of years. He is a representative of the National Federation of Engineering and General Ironfounders on the CFA, and a member of the CFA Executive Committee. He succeeds Mr. Kenneth Davis who has been chairman of the Training Committee for more than three years and has now asked to be relieved of his responsibilities.

News in Brief

OLDHAM HEALTH COMMITTEE is planning to have 659½ acres of the town under smoke control orders by October, 1961.

THE HEAD OFFICE of Malcolm & Allan (London), Limited, electrical contractors, has been moved to 229, High Street, Acton, London, W.3.

SCHEME OF ARRANGEMENT giving effect to the merger of Henry Simon (Holdings), Limited, of Stockport (Ches), and Simon-Carves, Limited, Stockport, has now been sanctioned.

FOLLOWING THE REFUSAL of an application by the British Piston Ring Company, Limited, to expand its Coventry works, the company now intends to develop at Lydney (Glos).

SOME 750 EXHIBITORS, 120 of them from outside the host country of West Germany, will be present at the International Machine Tool Exhibition to be held in Hanover from September 11 to 20.

ACCORDING to the Central Statistical Office of Pakistan, this country's imports of metals and ores during March, 1960, totalled Rs. 21,550,000 (£1,900,000 approximately), according to provisional figures.

DUTCH STEEL CONCERN, Koninklijke Nederlandsche Hoogovens en Staalfabrieken, of Ijmuiden, has reduced its official list price for pig-iron by Fl.50 per metric ton. The new price now varies between Fl.250 and Fl.285 per metric ton ex works.

THE International Nickel Company of Canada, Limited, has paid $265,000 for a group of about 60 claims which could lead to the opening of a new area for base metals in Manitoba. The claims are close to Island Lake, about 200 miles south-east of Inco's mine near Thompson, Manitoba.

ATTENDANCE at the International Machine Tool Exhibition, which closed at Olympia on July 8, totalled 105,030, compared with 102,316 at the previous show in 1956 which ran for a day longer. About 10,000 oversea visitors attended and reports indicate that the number of orders placed was substantial.

RETURNING from the British Scientific Manufacturers' exhibition in Russia, Mr. H. E. C. Nash, manager of the computer division of Elliott Bros. (London), Limited, announced that the National-Elliott 803 computer which was shown at the exhibition had been bought by the Russian Institute for Automation Research.

THIRD BRITISH exhibition to be held in Moscow in recent months was opened by Sir Patrick Reilly, the British Ambassador, on July 11. The exhibition—of yarn processing and knitting machinery—is a joint venture between the Bentley Engineering Group, Limited, Leicester, and Scragg Textile Machines, Limited, Macclesfield (Ches).

A GROUP of Japanese mining companies is sending a team of four experts to Ecuador to make a survey of the country's mineral resources. The mission, expected to reach Ecuador this month, has been sent at the Ecuadorean Government's request, and will explore the development possibilities of copper, lead, zinc, mercury, iron ore and antimony resources, as well as shipping the raw materials to Japan.

VENEZUELA'S iron ore production during the period January-April, 1960, totalled 6,400,000 tons, as against 5,000,000 tons in the corresponding period last year. Production for 1960 is estimated at 19,600,000 tons, as against 17,400,000 tons last year and 15,400,000 tons in 1958. Production of nickel in Venezuela during the first quarter of the current year totalled 270 tons. In the first quarter of 1959 the figure was 358 tons.

THIS AUTUMN, the Royal Society for the Prevention of Accidents is to hold a one-week residential safety training course for safety officers concerned with accident prevention in the building and civil engineering industries. The course will cover both theoretical and practical aspects of the work. All enquiries should be made to the Training Officer, Royal Society for the Prevention of Accidents, Industrial Safety Division, Artillery Mansions, 75 Victoria Street, London, S.W.1 (telephone: ABBey 6963/7).

FOLLOWING the announcement of the offer of Cambridge Instrument Company, Limited, for the whole of the ordinary share capital of Electronic Instruments, Limited, it is proposed that Electronic Instruments will operate under its own name. Mr. A. C. W. Norman will continue as chairman with Mr. P. Goudime as managing director and Mr. D. A. Pitman as sales director. They will be joined by three directors of Cambridge Instrument and Mr. Goudime will join the Cambridge Instrument board.

IT IS POINTED OUT that in the issue of the JOURNAL of July 7, page 23, the paragraph announcing, *inter alia*, the appointment of Mr. C. G. Pettit as chairman of the Society of Furnace Builders is misleading. This is because it reads as if the address of the Incandescent Heat Company, Limited, of which Mr. Pettit is assistant managing director is at Totley, Sheffield, whereas of course the firm is located at Cornwall Road, Smethwick, Birmingham. Apologies are recorded to all who were confused by the original paragraph.

EQUIPMENT AND machinery will be displayed by at least 240 leading companies at the Factory Equipment Exhibition sponsored by the Manchester Chamber of Commerce and other interests, to be held at Belle Vue, Manchester, from September 21 to October 1. The exhibition is supported by more than 250 trade and technical associations, institutions and societies. Exhibits will be grouped in 21 separate sections, each corresponding to a major division of industry. Area of the exhibition already exceeds 150,000 sq. ft., and there is a waiting list for each section.

EXHIBITION OF SCIENTIFIC equipment covering almost the whole range of industrial research and laboratory control and development for British industry was opened last week by Mr. K. G. Sinclair, chairman of Griffin & George, Limited. About 30,000 educational and industrial scientific instruments made by Griffin & George and by 20 other manufacturers whose equipment is distributed by the group were included in the three-day exhibition at Birkbeck College, University of London. Among the special fields covered were chromatography, microscopy, and soil mechanics.

INVESTIGATIONS CARRIED OUT by Mr. Sam Bracegirdle, of Wensleydale Road, Thornbury, Bradford, secretary of the Bradford branch of the United Patternmakers' Association, into sick-benefit records, show that sickness among patternmakers in a modern electrical works has been more than three times as high as in another works, and double than in two more in the past six years. Mr. Bracegirdle found from his investigations that (1) in a big electrical combine, sick benefit each year per man over the six years averaged just over eight days; (2) in an old-established family concern, it was almost three days; (3) in a master patternshop 3¼ days; and (4) in a motor-accessory firm almost 2½ days. He points out that the outstanding difference between the four firms is that the large electrical combine is the only one working on a "payment-by-results system." The age of the workers there was no greater than that of the others.

Personal

Mr. G. D. SPEAKE has been appointed deputy chief of research at Marconi's Research and Development Laboratories.

SIR FREDERICK HANDLEY PAGE has been awarded the 1960 Albert Medal of the Royal Society of Arts for "leadership in the design and manufacture of aircraft."

The Master Cutler, Mr. P. J. C. BOVILL, has been elected a vice-president of the South Yorkshire County Scout Council, in recognition of his many years' work on behalf of the scout movement.

Dr. ALFRED CARESS has been appointed a director of Imperial Chemical Industries, Limited. He is chairman of the company's fibres division and was the first chairman of the "Terylene" council.

Professor M. W. THRING, Professor of Fuel Technology and Chemical Engineering at Sheffield University, has been appointed a member of the Advisory Council of Research and Development.

Mr. ROBERT BRADLEY has joined Stanley Works (G.B.), Limited, Rutland Road, Sheffield, as chief planning engineer. He will be responsible for planning, work-study and design work on Stanley tools.

Aberdeen University has conferred the honorary degree of Doctor of Laws on Sir WILLIS JACKSON, FRS, president of the Institution of Electrical Engineers, and director of research and education of Associated Electrical Industries, Limited.

Capt. S. HARRISON-SMITH, head of the nuclear-power section of Swan, Hunter, & Wigham Richardson, Limited, has been appointed head of the engineering department at Neptune Works, Newcastle-upon-Tyne. He will continue as head of the nuclear power section.

Mr. F. H. SCHROEDER, M.I.MECH.E., A.M.I.E.E., has been appointed to the board of Metal Industries, Limited. For many years Mr. Schroeder has been a director of Lancashire Dynamo Holdings, Limited, which became part of the Metal Industries group earlier this year.

Mr. R. J. BUNN of the Metal Box Company, Limited, has returned to England after attending the 7th Materials Handling Training Course at Lake Placid, New York, as the winner of the 1960 John Morris Memorial Award offered by the British Industrial Truck Association.

Mr. PETER MARTIN, the general manager of the Sprotborough, Doncaster, foundry of John Fowler & Company (Leeds), Limited, has been appointed local director of the company. In 1949, he joined the company as chief engineer, and was appointed general manager three years ago.

Mond Nickel Company, Limited, announce that Dr. G. L. J. BAILEY has relinquished his position as superintendent of the development and research laboratory, in Birmingham, and has been transferred to London to become manager of research. He is succeeded in Birmingham by Mr. E. J. BRADBURY.

Scientific Instrument Manufacturers' Association of Great Britain has elected Mr. G. C. OTTWAY as president. He succeeds Mr. L. A. WOODHEAD, who becomes vice-president. Mr. A. W. JONES has been elected a vice-president, Mr. A. W. A. RUNDLE honorary treasurer, and Mr. E. R. PONSFORD secretary.

MRS. MARGARET PRICE (a director of a Salisbury, Southern Rhodesia, public-relations firm) has arrived in this country, where she is to address groups of executives on the potentialities of Que Que—Southern Rhodesian iron and steel producing centre—for the establishment of secondary industries in that locality.

Mr. W. L. CARDY has been appointed chairman of Associated Automatic Machine Corporation and the British Automatic Company, Limited, its subsidiary. He replaces Mr. B. M. TILL, who resigned from the board and from the corporation's subsidiaries last year. Mr. Cardy will continue as managing director of Associated Automatic.

For what will be his fourth term of office Mr. R. A. BARTRAM, chairman and managing director of Bartram & Sons, Limited, Sunderland, has been elected president of the Wear Shipbuilders' Association. He succeeds Mr. A. J. MARR, managing director of Sir James Laing & Sons, Limited. Mr. J. V. THOMPSON, managing director of Joseph L. Thompson & Sons, Limited, has been appointed vice-chairman.

Mr. RAY PLANT, technical representative with Industrial Products Refractories, Limited, was awarded the Lomas Trophy for the best score in the Refractories Association Golf Tournament which was played off in heavy rain on July 8. This new success represents an interesting "double." Mr. Plant was the winner also in last season's IBF Golfing Society handicaps cup at the Woodhall Spa meeting.

North-Eastern Area Transport Users' Consultative Committee has elected the following members:—Mr. J. GERRARD, managing director of Wright, Anderson & Company, Limited, structural engineers and bridge builders, of Gateshead; Mr. G. C. SEWELL, transport manager of the South Durham Steel & Iron Company, Limited; and Mr. I. S. MCKAY, distribution manager of the Billingham division of Imperial Chemical Industries, Limited.

The Export Credits Guarantee Department announces that the President of the Board of Trade has appointed Mr. J. N. HOGG as deputy chairman of the Department's Advisory Council following Sir Richard Jessel's resignation through ill health. Sir Richard Jessel has been a member of the Council for the past nine years, including one year as deputy chairman. Mr. J. N. Hogg is a managing director of Glyn, Mills & Company, and deputy chairman of the Standard Bank of South Africa. He is also director of Borax Holdings, Limited, and Gallagher, Limited.

Obituary

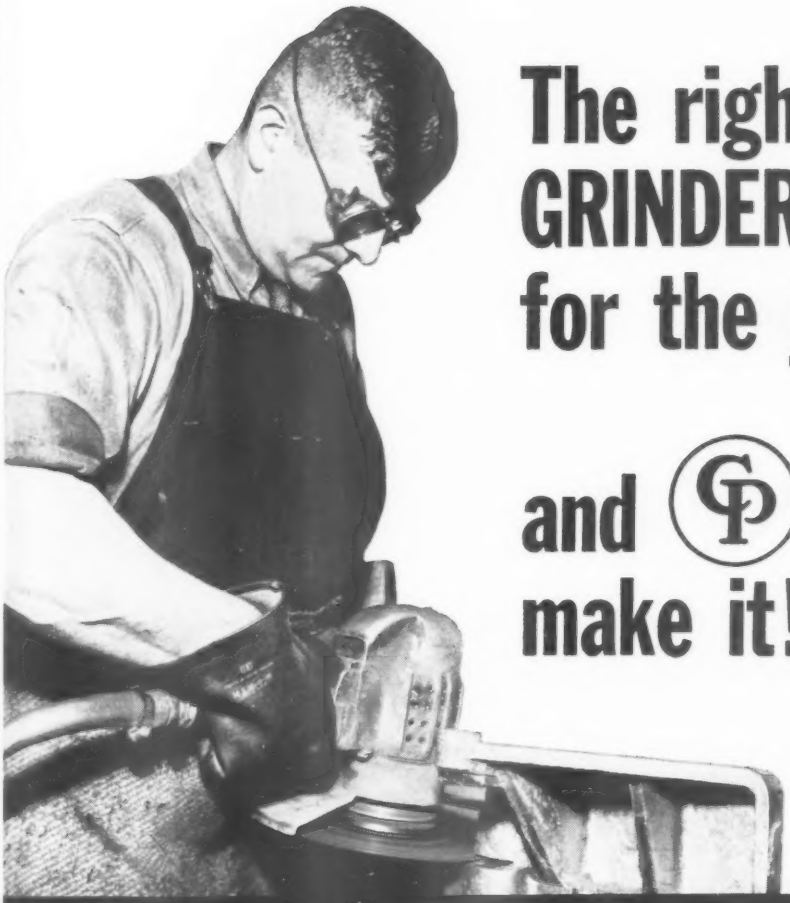
Mr. STANLEY GEORGE, foundry manager, Laurence Scott, Electromotors, Limited, died recently, aged 51.

The death has occurred of Mr. JOHN H. BIRCHALL, personnel manager of Guest, Keen & Nettlefolds (South Wales), Limited. He was 54.

Mr. HUGH COWAN-DOUGLAS, C.A., who has died at his home in Glasgow at the age of 64, was chairman of Glenfield & Kennedy, Limited, hydraulic engineers, Kilmarnock, and of other companies. He was a director of 20 concerns.

Mr. E. H. MUSCROFT, London director of Cox & Danks, Limited, a Metal Industries Group subsidiary, died suddenly at his home in Beaconsfield on July 11. Mr. Muscroft, who was born in Sheffield in 1917, was educated for the law. He joined Cox & Danks in 1946 and was made a director in 1954.

The sudden death occurred earlier this month of Mr. R. CORBETT, for several years metallurgist with English Electric Company, Limited, at Stafford. In his mid-thirties, Mr. Corbett was previously with the Ever Ready Company (Great Britain), Limited, at Wolverhampton, and before that with John Harper & Company, Limited, Willenhall.



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"Power Vane" 5132-A Angle Grinder

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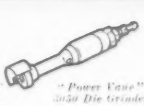

"Power Vane" 5050 Die Grinder

One company needs a tool for polishing hub caps. Another for the heavy duty grinding of giant castings; yet another has to tackle the problem of grinding in awkward positions and needs an angle machine. And for *all* these jobs—CP can supply the tools.

CP in fact make the right grinder, polisher, or wire brush machine for *every* type of work from shipbuilding to the finishing of small parts. Six of CP's wide range of grinders are illustrated here; you can see the full range in the CP Grinder Catalogue.

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CP/217

Raw Material Markets

Iron and Steel

There is very little change in the general position governing the ironfoundries. Those catering for the motor industry, heavy vehicles and general engineering trades are exceptionally busy and are taking up considerable supplies of low phosphorus hematite and refined pig-irons, production of which is at a very good level. There is no shortage of these irons, and in fact output could be increased if the need arises.

There is also plenty of high phosphorus pig-iron available for the light foundry industry and for the textile machinery trade. The light foundries catering for the building industry are fairly busy, but there has been a diminution in demand for castings for heating apparatus and domestic utensils. Some foundries could increase their outputs, but are having difficulty in getting the requisite skilled labour.

Supplies of coke from Wales and Durham are coming forward according to programme, and no difficulty at all is being experienced. Supplies of scrap too are fairly plentiful except in special selected grades for particular needs, and the foundries have no difficulty in securing their requirements in limestone, and ganister.

The re-rollers have very good order-books for light sections, bars, strip, and reinforcing bars, and fortunately the supply of billets is at present adequate for their requirements. Their level of capacity is governed by the labour situation and most of the re-rollers are still short of skilled workers. The supplies of billets from home sources have been good in recent weeks, and these supplies have been augmented by Canadian billets, chiefly in the 2-in. sizes, which fill an appreciable gap. As the supplies of prime billets are becoming more plentiful, it is now becoming difficult to get rid of defectives and crops, but the stocks of these are not heavy.

Non-ferrous Metals

The situation in the Congo continues to dominate the copper market and prices in London have fluctuated according to the tenor of the reports emanating from that country. The present position is still somewhat obscure. However, it is now established that the Union Minière mines will reopen and will be back in production within a week. No damage to the mines or to the refineries has been reported.

This news sent the market quotations in reverse as it meant that a temporary shortage of the metal would not now occur and also it was felt to be indicative of better and more settled conditions. However, the question of the Province of Katanga is still unsettled, but it would appear that Belgium will recognize its independence thereby enabling it to save its most valuable mining enterprise.

There is, too, the effect of the Russian announcement that it would support the Congolese against the Belgians and this move made for uneasiness in the market which more than offset the news that last week stocks of refined copper in LME warehouses rose by 750 tons to a total of 4,485 tons. This was the largest rise in a single week since the end of April.

The outlook in London will continue to be dominated by the Congo situation so that day-to-day fluctuations in the price will mean comparatively little in relation to the demand trend.

In the US demand continues to be only fair while refined copper production is still mounting, thereby making for conditions of over-production in relation to demand. Nevertheless, the price of 33 cents a pound is still the quotation listed by both the producers and the custom smelters.

Elsewhere, the news of importance is that Anaconda has entered into negotiations with the unions at Chuquicamata in an attempt to renew the labour contract which expires at the end of next September. Anaconda are offering a straight renewal as against the unions demanding a 70 per cent. wage increase together with substantial fringe benefits.

Tin is a firm market in London, Singapore, and New York where the price is well clear of $1.03 a pound. The overall position is also good and with consumption remaining at a consistently high level and production on a world basis falling away, the outlook is good. The position in the Congo does not come into the picture to any degree principally because there have been no reports stating that the tin mines have been affected by the present disturbances. Last week the tonnage of refined tin in LME warehouses rose by a further 319 tons to 9,368 tons.

Zinc is a better market in London than in New York where demand has been disappointing and has led to a reduction in the premium for special high grade metal to 1½ cents a pound and to 1.35 cents a pound on ordinary high grade metal. The holiday season is affecting the New York market and, to a lesser degree, the market in London. In the US the price is unchanged at 13 cents a pound.

Lead continues to be a weak market on both sides of the Atlantic. The underlying cause of the weakness is the feeling that the 10 per cent. restriction on availability will be removed in the last quarter of this year. If this is true the price will fall sharply and, if substantial tonnages are offered to the market from metal already held back under the 10 per cent. restriction, the market will be facing a crisis of the first magnitude. In the US the market is quiet with the price still called 12 cents a pound.

Orders Placed

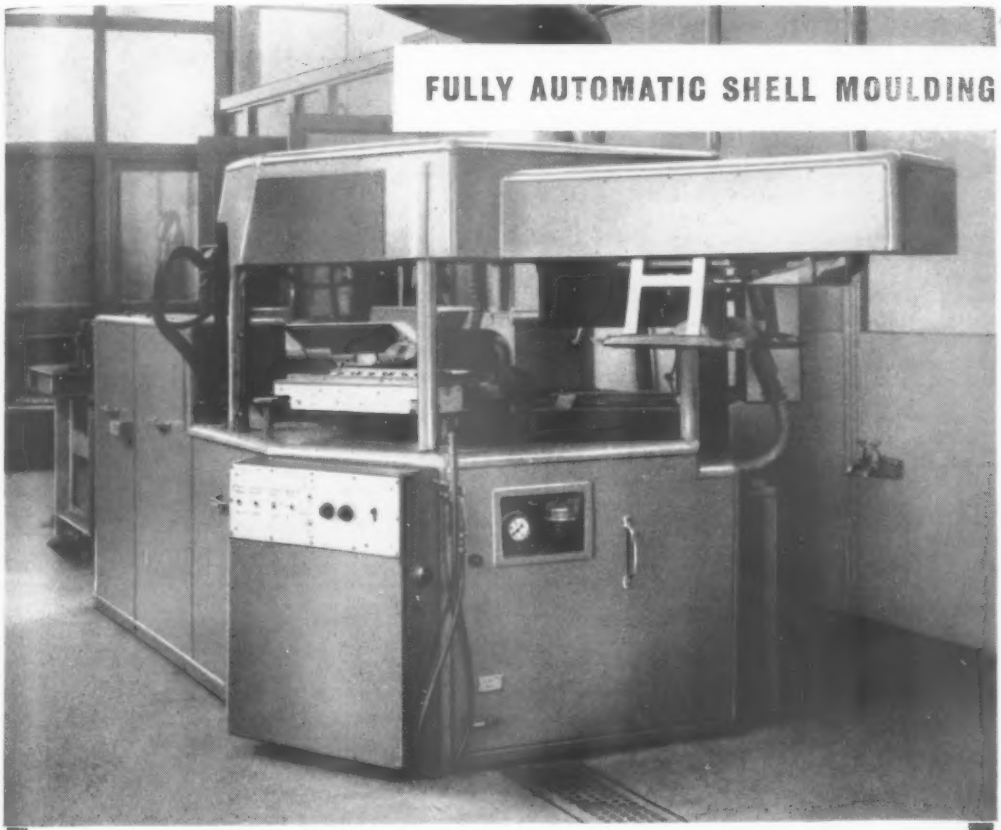
LARGE ORDER for "Fin-Fan" air cooled heat exchangers has been placed with Head Wrightson Processes, Limited, a subsidiary of Head, Wrightson & Company, Limited, by the Iraq Petroleum Company, Limited. They will be used to cool lubricating oil from gas turbines at two pumping stations. The total installation is worth approximately £55,000.

Two 11kV 15 mW single pass-out turbo-generators have been ordered from the General Electric Company, Limited, by the Government of Qatar, in the Persian Gulf, for installation in a new power station to be built at Ras Abu Aboud. The order is worth £700,000. The first generator set is to be delivered by December, 1961, and the second by March, 1962.

PRIESTMAN BROS., LIMITED, Hull, has ordered an EMI-Wadkin electronically controlled drilling machine, worth nearly £10,000, from EMI Electronics, Limited. It will be used for making drill jigs and for other toolroom uses. It can accurately position and drill holes up to 2 in. in diameter in thick steel in a fraction of the time taken by a skilled operator working a conventional drill.

Building Trades Exhibition

A Building Trades Exhibition, organized by Provincial Exhibitions, Limited, is to take place in the City Hall, Manchester, from October 11 to 22. The Exhibition will cover every facet of the building industry, and all the latest products will be on show, including the most modern crawler and wheeled tractors and new fastening equipment.



Production rate 75 shells per hour

The new Baker Perkins Shell Moulding Machine is fully automatic in its operation. The sand/resin mixture supplied to the storage hopper is automatically fed to the machine. The finished shells are automatically removed from the ejection station, and from there if required to a suitable conveyor.

Short runs are entirely practicable, pattern changing being simple and quick, taking only five minutes and effected single-handed.

On production, shells 18" x 12" weighing 4 to 4½ lbs. are produced at the rate of 75 per hour maximum.

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BP/F5

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

July 20, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £42 10s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 15s. 0d. to £61 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 10½d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 9 6/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C. £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d. angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast) £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over. £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £257 0s. 0d. to £257 5s. 0d.; three months, £248 0s. 0d. to £248 10s. 0d.; settlement, £257 5s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 5½d. per lb.; rods, 269s. 0d. per cwt. basis; 20 s.w.g., 304s. 0d. per cwt.

Tin.—Cash, £818 0s. 0d. to £818 10s. 0d.; three months, £818 0s. 0d. to £819 0s. 0d.; settlement, £818 10s. 0d.

Lead (Refined Pig).—Second half July, £71 0s. 0d. to £71 2s. 6d.; second half October, £71 17s. 6d. to £72 0s. 0d.

Zinc.—Second half July, £90 15s. 0d. to £91 0s. 0d.; second half October, £90 0s. 0d. to £90 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £126 5s. 0d.; rolled zinc (boiler plates), all English destinations, £124 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £105 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0⅝d. per lb.; sheets to 10 w.g., 219s. 0d. per cwt.; wire, 2s. 10d.; rolled metal, 219s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £176; B6, £227.

Brass (High Tensile).—BS1400, HTB1, £202; HTB2, £222; HTB3, £236.

Gunmetal.—BS1400, LG2, £225; LG3, £235; G1, ½%, £290; G1, 1%, £277.

Phosphor Bronze.—BS1400, PB1 (AID released), £321; BS1400, 90/10/1, £305.

Leaded Phosphor Bronze.—BS1400, LPB1, £245.

Phosphor Bronze Strip, etc.—Strip, 312s. 0d. per cwt.; wire, 4s. 3¾d. per lb.; rods, 3s. 6d.; tubes, 3s. 6d.; chill cast bars, solids 3s. 5¾d.; cored 3s. 6¾d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 0¼d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 5½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 4½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb; Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £70 0s. 0d. to £70 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £260, AB2, £269.

* Average 68–70 per cent.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRY MANAGER/SUPERINTENDENT desires change. Mall. and grey, practical and technical. Take full control foundry. Rate fixing, etc. Wolverhampton area. Box FM740, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE (46) requires position with Iron and/or Steel Foundry. Connections in Lancashire and Yorkshire and N. England (grey and special cast irons, carbon and alloy steels.) Considerable technical, administrative and sales experience. Box TR732, FOUNDRY TRADE JOURNAL.

SHOTBLAST DESIGN ENGINEER seeks change. Age 39 with 18 years' experience designing all types of wheel and airblast plants. Qualified to take full charge from basic ideas to starting up plant. Representative (not sales) capacity preferred but not essential. Box SD745, FOUNDRY TRADE JOURNAL.

A KEEN knowledge of the Industry, integrity and enthusiasm, are the qualities offered to a reputable foundry, by a TECHNICAL REPRESENTATIVE, age 34, covering London and the Home Counties. Box AK742, FOUNDRY TRADE JOURNAL.

TECHNICAL SALES REPRESENTATIVE covering most of country north of Coventry, for High Duty Iron Foundry. At present based on Manchester. Own office. Thirty-two years' experience in sales of castings and other engineering materials. Practical and university training. Used to handling commercial, technical, and development problems at all levels. Desires similar post due to closure of present foundry. Box TS749, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOUNDRY SUPERINTENDENT required for small expanding iron-foundry in West Bromwich producing high grade medium castings in sand and shell moulding process. Full experience essential. State age, experience and salary expected to Box FS745, FOUNDRY TRADE JOURNAL.

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Must have working electrical knowledge and experience on modern foundry plant—grey iron and non-ferrous.
This is a staff appointment in an expanding organization with good pay and prospects for methodical, keen and efficient man.
House available near good schools and shops eminently suitable for youngish married man.
Apply in own handwriting giving full particulars and copies of any testimonials available.

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SITUATIONS VACANT—*contd.*

CHIEF PLANNING ENGINEER required for Investment Foundry at Redditch. He will be responsible for design and manufacture of dies and tools as used in the "lost wax" process. Components vary from turbine blades to general commercial work. Drawing Office and Toolroom experience necessary. H.N.C. an advantage. Preference given to applicants with experience in die design for Investment Foundry or Diecasting applications. Full details of experience and positions held should be sent and all applications should indicate salary required. Box CP719, FOUNDRY TRADE JOURNAL.

FOUNDRY SUPERINTENDENT required for mechanised foundry in the Midlands producing grey and malleable iron. Applicants should have had considerable all-round experience of foundry procedure including metal control and must be able to supervise operations on the shop floor also direct and control staff. Pension scheme in operation. Apply stating experience, qualifications and salary required, to Box FS750, FOUNDRY TRADE JOURNAL.

A.P.V.-PARAMOUNT LIMITED, one of the principal stainless, heat resisting and alloy steel foundries in the United Kingdom, requires an ESTIMATOR to be responsible to the Chief Estimator for the preparation of quotations for alloy steel castings ranging from a few ounces in weight to over two tons, produced by the latest foundry techniques. While it is desirable that applicants be experienced Foundry Estimators, consideration will also be given to candidates with a foundry engineering background who are considered suitable for further training. Applications will be treated in strict confidence and should be addressed to: THE SALES DIRECTOR, A.P.V.-Paramount Ltd., Crawley, Sussex.

SITUATIONS VACANT—*contd.*

WORKS MANAGER required for large Midland non-ferrous foundry. Excellent position for experienced technician with copper base castings and aluminium sand and die. Box WM737, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST required for Ferrous Foundry (mechanised, situated in East Anglia. Cupola control essential and must have practical experience in sand control. Send details of experience, age and salary, to Box FM735, FOUNDRY TRADE JOURNAL.

RADIOLOGIST required to take charge of X-Ray and Gamma Ray Department attached to Investment Foundry at Redditch. A.I.D. approval a necessity for ferrous alloys, and preferably for light alloys and brass. Write, giving details of age, experience and salary required, to Box RA734, FOUNDRY TRADE JOURNAL.

WANTED.—FOUNDRYMAN, age around 35 years. Strict disciplinarian to take charge of small grey iron and malleable foundries in Walsall area. Fully experienced in progresing work through foundries for machine and stump moulding. Able to fix piece work prices in foundries and coreshop. State full details of experience and present salary. Box WF736, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER. Applications are invited from experienced men for the position of Foundry Manager. Experience and Hand Moulding, Mechanical Systems for Heavy and Light Machine Moulding for batch production, Core Making, Pattern Making, Sand Control. Must have experience of Foundry Cost Systems and Profit Control. Man of strong personality between 35 and 45 years. Apply Box FM745, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER

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SITUATIONS VACANT—*contd.*

REQUIRED for India: Non-ferrous foundry TECHNICIAN, about 30 years of age. Must have experience in copper base alloys in Sand, and die casting with metallurgical background. Also must have minimum two years' experience in a managerial position in modern Foundry and conversant with modern practices. Attractive salary and excellent prospects for further advancement. First class passages paid—generous leave terms. Reply: Box RE718, FOUNDRY TRADE JOURNAL.

BROWN, LENOX & CO., LTD., Pontypridd, Glam., require the services of an INSPECTOR in their Steel Foundry. This is a staff appointment. Applicants must have had Steel Foundry or Allied Inspection experience, and be capable of marking off. Time served fitters or machinists would be considered. Please write giving brief details to the WORKS MANAGER.

ASSISTANT FOUNDRY MANAGER. Applications are invited from experienced men for this position. Must have sound knowledge of all aspects of the production of ferrous and non-ferrous Castings by hand and mechanised means. Preferred age 30-40 years. Good disciplinarian. Starting salary would be by negotiation, based on experience, qualifications and ability. Contributory Pension and Employees Share-holding Schemes operated. Box AF746, FOUNDRY TRADE JOURNAL.

FOUNDRY TECHNICIAN required, age 26-35. Should have basic training and good technical education including laboratory experience. Experience in copper based alloys essential and the ability to undertake investigations and initiate original development work in the foundry a principal requirement. Salary range £1,000 to £1,200 p.a. Write stating age, qualifications and experience to GENERAL MANAGER, c/o Box TF721, FOUNDRY TRADE JOURNAL.

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FOUNDRY TRADE JOURNAL

SITUATIONS VACANT—*contd.*

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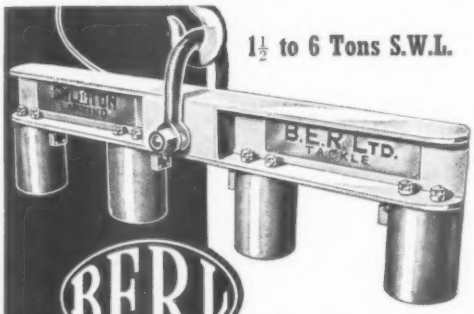

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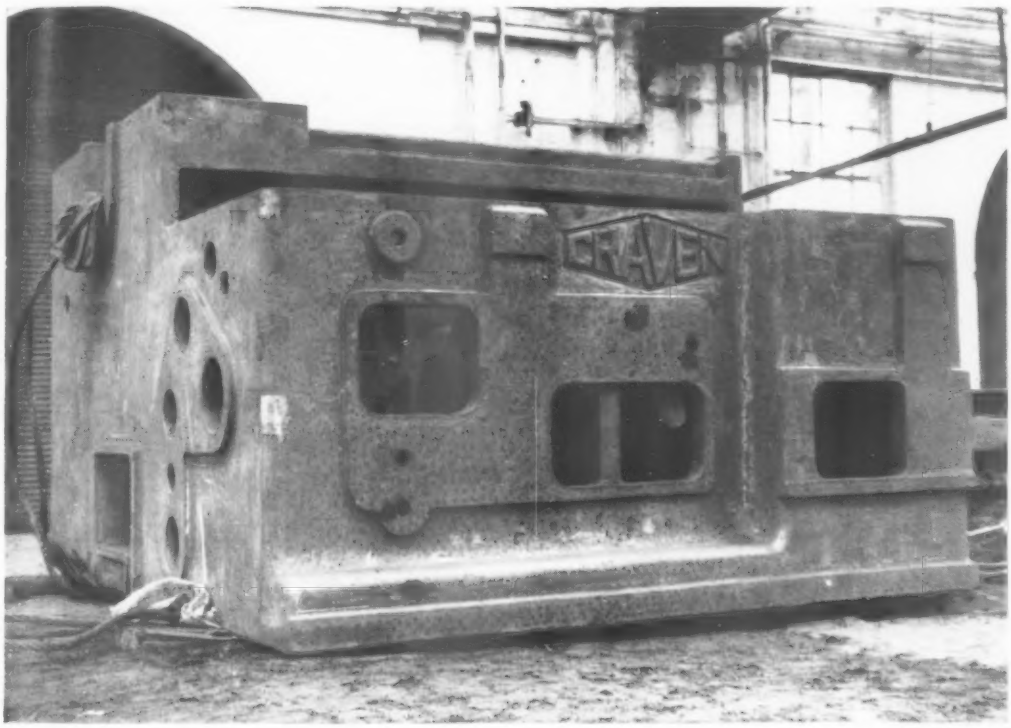

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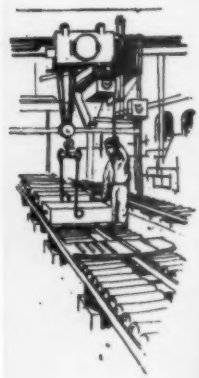

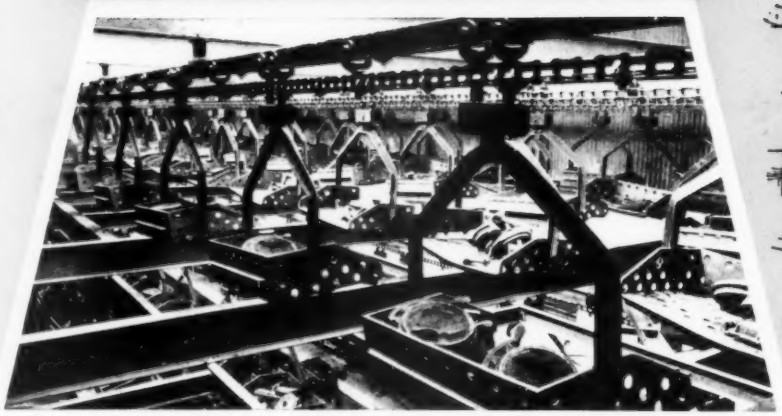

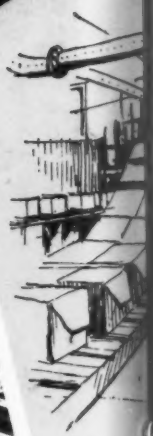

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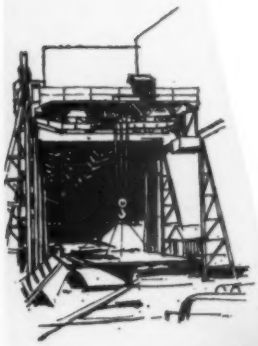

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